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INVESTMENTS IN AGRICULTURE:

A Synthesis of the Evaluation Literature

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PREFACE

This assessment examines the conditions under which investments in the five major areas of agricultural development have been successful, and unsuccessful, in contributing to broadly based agricultural growth in the developing countries.

The assessment is a desk study. It uses the evaluation synthesis methodology, which is an approach that relies primarily on past evaluations of, in this case, agricultural assistance programs, in order to answer six key questions of importance to USAID managers. This methodology has certain limitations. First, because it is based on the evaluation literature, it can address only those questions that are covered in that literature, and in this case, some of the six questions were not satisfactorily addressed in past evaluations. Second, unlike original research, it does not generate new ideas, although a review and synthesis of past experience very often yields new insights about old ideas. Third, it reports findings and generalizations emanating from a broad array of country programs worldwide, and the implications of these generalizations may or may not be germane to specific agricultural investment decisions in contemporary country situations.

CDIE initiated the desk study by commissioning a series of background papers in four of the five major areas of agricultural development. The fifth major area, rural infrastructure, had already been covered by Raisuddin Ahmed and Cynthia Donovan of the International Food Policy Research Institute (IFPRI) in a synthesis of the literature published in 1992. The other four areas were: economic policy reform and planning; agricultural technology development and diffusion; agricultural services; and agricultural asset distribution and access. Each background paper used the same analytical framework that had been used in the IFPRI synthesis on rural infrastructure, thereby facilitating preparation of the final desk study. However, the four papers were prepared under rather rigid time constraints (approximately seven person weeks per paper), which constitutes yet another limitation of the study.

The consultant team which drafted the four background papers included Scott Simons, Lawrence Kent, James F. Oehmke, Richard L. Meyer, Donald W. Larson, Virginia Lambert, Mitchell A. Seligson, and David Wilcock. In addition, James Esselman conducted a thorough search of the evaluation literature, both USAID and non-USAID.

* * *

The final desk study benefitted greatly from a review by several individuals, including the expert consultants named above. In addition, Luther Tweeten, G. Edward Schuh, and John Eriksson provided insightful comments that were particularly helpful. However, the views and interpretations expressed in this report are not necessarily those of the reviewers or of the Agency for International Development.

SUMMARY

USAID has obligated substantial resources to support agricultural development in the low income countries during the past 20 years (and more). During several years of the 1980s, USAID investments in agriculture exceeded \$1 billion. It is probably fair to say that no single component of U.S. foreign assistance supported by USAID during this period was larger than the agriculture assistance program.

Agriculture is interpreted broadly by the Agency, as it is by Section 103 of the Foreign Assistance Act. It includes five essential elements, and over the years, USAID has provided resources to support and strengthen each of these five basic components. The five elements include: (a) an economic policy framework that is conducive to agricultural growth; (b) agricultural technology applicable to particular soil, water, and climatic conditions; (c) roads and related rural infrastructure to transport agricultural inputs and to market agricultural outputs; (d) agricultural services (especially credit); and (e) secure tenure arrangements to encourage investment in land and other agricultural assets.

This desk study sought to identify the conditions under which investments (especially USAID investments) in these five major areas of agricultural development have been successful, and unsuccessful, in contributing to broadly based agricultural growth in the developing countries. It also sought to determine whether or not the evaluation synthesis methodology, which was used to carry out the desk study, might be an appropriate way to evaluate other USAID programs.

The evaluation synthesis methodology, an approach frequently used by GAO, is designed to analyze large amounts of sometimes conflicting information about a particular program, in this case, USAID's agricultural assistance program; see Annex B. To carry out the desk study, expert consultants first synthesized the evaluation literature in the five major areas of agricultural development. Each background paper followed the same common analytical framework, one that had been developed by IFPRI in a synthesis of the literature on infrastructure. The consultants' own expertise, coupled with a literature search conducted by CDIE's Research and Reference Service, constituted the foundation on which the background papers were developed. The five background papers, in turn, constituted the basis for drafting the desk study (which can be characterized as a synthesis of syntheses) on Investments in Agriculture.

The desk study attempted to answer six key questions important to USAID managers.

1. Which agricultural investments are most appropriate for various levels of institutional and policy development; is there a logical sequence for investing in the five agricultural sub-sectors?
2. Has successful agricultural development occurred in the absence of investments in one

or more of these five areas?

3. Under what conditions have investments in each of the agriculture areas been relatively successful, or resulted in a relatively high economic rate of return?
4. Is the private sector best suited to invest in certain areas (such as agricultural services) and is the public sector best suited to invest in other areas (such as rural infrastructure)?
5. Among the various agencies that implement agriculture activities (including NGOs) are some better suited in certain areas than others?
6. Does the U.S. have a comparative advantage in providing agricultural assistance in some areas compared to others?

Although most of the issues addressed in this desk study concern the role of the public sector, most economists agree that successful agricultural development must rely primarily on the market and that most investment decisions will have to be made by the private sector. However, as suggested by the findings below, the public sector must assure that the private sector can operate effectively.

Findings

1. Sequencing Investments in Agriculture. The evaluation literature suggests that there is a preferred sequencing of investments in agriculture. The overriding priority concerns policies that directly or indirectly affect agriculture and that create an environment in which agriculture can function. Farmers must have an opportunity to make a profit, and the economic policy environment must be in place to create this opportunity. If a threshold level of proper policies is not in place, it is not worthwhile for donors to contribute to any other investments in agriculture; nor is it worthwhile for farmers to take risks and use new technologies needed to increase production beyond subsistence levels.

There is no particular sequence for investing in agricultural technology vis a vis rural infrastructure. Investments in both work synergistically if the proper policy environment is in place, so that investments in one reinforce investments in the other. High yielding agricultural technology must be available in order to promote agricultural growth. At the same time, agriculture cannot perform well unless some rudimentary infrastructure is in place.

Many projects designed to provide agricultural services (typically agricultural credit or marketing services) have failed, usually because countries were pursuing economic policies heavily biased against the agriculture sector. Credit projects have also run into difficulty because there was a poor supply of good technology available for farmers to adopt. In addition, there was little value in supplying credit or modern inputs associated with new

technologies to farmers who lacked the roads to acquire the inputs and to transport the harvest to market.

The evaluation literature suggests no particular stage of development for investing to improve access to land. It does, however, suggest that when investments to improve land distribution take place, they will take place to achieve a political objective, not an economic efficiency objective. Still, in spite of the political considerations that drive the decision, such investments will have an economic impact, positive or negative, intended or unintended, and this economic impact is likely to be more positive if a package of ancillary services to support the investment is already in place. In this sense, then, investments to improve land distribution should support agricultural development, not initiate the process.

2. Are All Five Elements of Agriculture Critical? There is little in the literature that directly addresses the counterfactual question concerning whether or not agricultural development can be achieved in the absence of investment in any of the five key elements of agriculture. What does emerge is that a country's predisposition to agricultural development is an important condition for success -- whether or not this predisposition is linked to donor investments. In particular, some level of economic and social stability is essential for agricultural progress. The macroeconomic policy environment need not be highly supportive; at the same time, an egregiously unfavorable macroeconomic climate does not enable agricultural development to proceed.

Most countries have not achieved sustained economic growth without transforming agriculture, and the agricultural transformation has generally rested squarely on intensification and technical change. Once acreage expansion is no longer an option, gains in output must be achieved by increasing yields on existing land. This requires improved biological and mechanical technology. Although technology development is critical, there is no empirical evidence that investments in agricultural extension or in higher agricultural education are necessary for successful agricultural development.

Agriculture may develop in the absence of investments in rural infrastructure, but it will develop far less rapidly. Similarly, agricultural development can occur in the absence of investments in agricultural services, but a more sophisticated level of agricultural development will, at some point, require an increasingly wide variety of such services.

3. When Are Investments in Agriculture Most Successful? Economic analyses have not been very helpful in guiding resource allocation decisions among sectors of an economy (or among the key elements of agriculture), although they have helped in making intra-sectoral choices among various types of projects and technical alternatives. Instead, investments in agriculture have been most successful when a bottleneck has been relieved in the presence of favorable preconditions. For example, agricultural research is more likely to have a high payoff in countries characterized by sound economic policies and basic infrastructure. Similarly, infrastructure investments are more likely to have a high payoff in the presence of supportive economic policies and the availability of improved agricultural technology.

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The most successful policy reform activities were those that supported an existing program of policy change. Attempts to introduce major new policy directions through program assistance often produced disappointing results. The most successful capacity building projects occurred in countries where advisors had access to senior government advisors, appropriate counterparts were assigned to advisors, there was adequate funding and supplies, and there were incentives for highly trained staff to stay with the analysis units. In contrast, countries that were resisting reform had little use for even the most cogent and forceful of analyses produced by such projects.

One lesson from the rate of return literature overwhelms all others: investments in agricultural technology and diffusion have typically generated high rates of return, demonstrating that the social benefits from the investment justify the costs in a wide variety of countries, for a wide variety of commodities, and under diverse conditions.

Resources tend to be allocated to infrastructure development only when bottlenecks and pressure for services are felt within the political system. And when this occurs, decisions on how much to allocate to infrastructure vis a vis other activities are typically a matter of judgement; no generalizations emerge from the evaluation literature.

As in the case of policy reform, few studies measure the economic rate or return to investments in agricultural services. This is largely because of the difficulty of measuring the return to these kinds of investments which, by their nature, do not directly increase agricultural output. Instead, they create an enabling environment to encourage the use of directly productive inputs such as improved seeds, fertilizers, chemicals, and machinery.

There are at least two costs of not investing in a more equitable distribution of land and other agricultural assets. First, there are economic costs associated with maintaining an agrarian structure characterized by high efficiency losses, low profitability, and few incentives to invest in physical and human capital in the agricultural sector. Second, there are social costs manifested by peasant uprisings, civil war, and protracted and violent struggles. Still, governments typically do not invest in more equitable land distribution because they lack the political support to implement change and because the cost of land reform is so high as to make it infeasible in many cases. Small farmers cannot pay for the land they receive, and elites tend to resist paying for the reform either through taxes or through receipt of devalued bonds as compensation for expropriated land.

4. The Role of the Public and Private Sectors. A useful rule of thumb is that the government should become involved in a particular investment only if it raises real national income. Another useful rule is for the public sector to become involved when it improves the private sector rather than displaces it.

As such, it is logical that the public sector invest in the development of agricultural technology and of rural infrastructure, since these investments normally have the characteristics of public goods whereby it is difficult for a private firm to recover the costs of

such investments. However, the cost of using the services made possible by the rural infrastructure -- as distinct from the infrastructure itself -- should be paid by the users of those services, not by the government or by donors.

Similarly, it is logical that the public sector has been the recipient of most donor assistance designed to support policy reform and planning as well as improved asset distribution and access, since it is the responsibility of governments to take decisions in these areas. In contrast, the private sector can be expected to invest in agricultural services when it is profitable to do so, obviating the need for public sector involvement.

5. The Role of Alternative Implementing Agencies. For the most part, the evaluation literature is silent on the relative merit of various agencies to implement various types of agriculture activities. Donor involvement has been important in providing the analytical underpinning for policy reform activities, but governments have actually implemented such reforms, often in conjunction with program assistance provided by donors. Similarly, governments are best suited to implement programs designed to improve asset distribution, but donors can provide advice on how best to go about implementing these programs. Some have asserted that U.S. land grant universities are well positioned to implement agricultural technology development and diffusion activities; they may be, but the evaluation literature provides no empirical evidence to substantiate or refute this assertion. Conventional wisdom suggests that private contractors are best suited to implement infrastructure activities, but again, there is no empirical evidence to support this one way or the other. Finally, commercial banks have the best record of providing financial services, and private firms have a better track record than government agencies of providing efficient and timely agricultural inputs and marketing services.

6. The Comparative Advantage of the U.S. The evaluation literature suggests that the U.S. has an advantage over other bilateral donors in providing assistance in the area of agricultural policy reform and planning. Although U.S. agriculture is among the most productive in the world, owing largely to yield-increasing technology developed as a result of investments in agricultural research, there is no empirical evidence that the U.S. enjoys a comparative advantage in providing assistance in this area. The development of rural infrastructure often requires a major capital investment, and donors with a large supply of resources, including the multilateral development banks, would seem to be in the best position to finance big-ticket capital projects. The private sector in most developing countries is ordinarily best equipped to deliver agricultural services. Finally, international donors, including the U.S., have very little influence over whether or not programs designed to alter the agrarian structure take place.

Management Implications

Thus, the evaluation literature provides clear answers to some -- but not all -- of the six questions raised in this desk study concerning when to make investments in the five sub-sectors of agriculture, who should make those investments, and the conditions under which

they are most likely to be successful. This suggests that there is no substitute for careful analysis of each country situation.

The literature also suggests that a country's predisposition to agricultural development is an important condition to success -- whether or not this predisposition is linked to donor investments. This means that in countries where agriculture cannot be profitable because of an adverse economic policy environment, including both macroeconomic and agricultural policies, USAID should be reluctant to invest in agricultural development.

When it makes sense to invest in agricultural development, USAID should focus on those priority areas that typically constitute the key bottlenecks to agricultural growth. In low income developing countries, these key bottlenecks are most likely to occur in the areas of policy reform, technology development, and rural infrastructure. They are least likely to occur in the areas of agricultural services and agricultural asset distribution.

1. Program assistance designed to help governments establish a favorable economic policy environment is generally most successful when used to facilitate on-going economic policy reforms. It is usually not as successful when used to initiate new policy reforms or to "buy" economic policy reforms to which the government is not committed.
2. If high economic rates of return were the only criterion USAID used in deciding how to invest in the agriculture sector, investing in the development of new agricultural technology would probably top the list. An even more compelling reason to invest in the development of new high-yielding or cost-reducing agricultural technologies is that most countries have not achieved sustained economic growth without transforming their agriculture; and the agricultural transformation typically requires technical change -- that is, improved biological and mechanical technology.
3. It is unlikely that agricultural growth will occur in the absence of investments in rural infrastructure. However, donors are understandably reluctant to invest in rural infrastructure, not only because such investments are relatively costly but also because existing infrastructure is often not maintained by the public sector.
4. The private sector is best equipped to provide agricultural inputs and services that can be sold for a profit. Government and donors do not have a comparative advantage in this area.
5. Programs designed to improve the distribution of land and other agricultural assets are motivated by political objectives, not by agricultural development objectives. Most investments in this area are best left to the public sector of the developing country.

GLOSSARY

AEPRP	African Economic Policy Reform Program
ADB	Asian Development Bank
APAP	Agricultural Policy Analysis Project
CDIE	Center for Development Information and Evaluation
CGIAR	Consultative Group for International Agricultural Research
EER	Economic Rate of Return
ESAF	Enhanced Structural Adjustment Facility
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization
GAO	Government Accounting Office
GDP	Gross Domestic Product
IDB	InterAmerican Development Bank
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
LAC	Latin American and Caribbean
LDC	Less Developed Country
MADIA	Managing Agricultural Development in Africa
NGO	Non-governmental Organization
NIS	New Independent States
PASA	Participating Agency Service Agreement
SAL	Structural Adjustment Loan
SAF	Structural Adjustment Facility
SECAL	Sectoral Adjustment Loan
UNDP	United Nations Development Program
USAID	United States Agency for International Development

1. INTRODUCTION

The purpose of this study is to identify the conditions under which investments in the five major areas of agricultural development have been successful, and unsuccessful, in contributing to broadly based agricultural growth in the developing countries.

A. Agriculture: Working Definition

For purposes of this desk study, agriculture is defined as those activities traditionally funded under Section 103 of the United States Foreign Assistance Act (FAA). Section 103 is interpreted broadly in the legislative history to consist of activities in support of rural, non-farm production as well as simply agricultural production. These activities can be conveniently organized into five main sub-sectors.

1. **Policy Reform and Planning** (budget support for agricultural policy reform; analytical capacity building).
2. **Technology Development and Diffusion** (agricultural research; agricultural education; agricultural extension).
3. **Rural Infrastructure** (rural roads; rural electrification; irrigation).
4. **Agricultural Services** (agricultural credit; input and output marketing; crop storage).
5. **Asset Distribution and Access** (land tenure and land reform; land use and land settlement; local participatory institutions and decentralization).

USAID's "Agricultural Development Policy Paper" of 1978 disaggregated the activities covered under Section 103 into these five sub-categories (excluding nutrition). They have remained fundamentally unchanged since that time (although certain elements have been refined). In addition, a sixth sub-category of agriculture -- natural resources and the environment -- was added in the mid-1980s in recognition of the importance of sustainable agricultural development. This sub-category includes activities in soil and water conservation, forestry, and environmental planning. Adding this sixth sub-category also reflected the fact that Section 103 (the "agriculture, rural development, and nutrition" account) had become the source of about 75 percent of the funding of these natural resources and environmental activities. Because these activities are currently being evaluated by

CDIE,¹ they were excluded from this desk study.

Thus, successful agricultural development normally requires: (a) an economic policy framework that is conducive to agricultural growth and in which farming can be profitable; (b) agricultural technology applicable to particular soil, water, and climatic conditions; (c) roads and related rural infrastructure to transport agricultural inputs (such as seeds and fertilizers) and to market agricultural outputs; (d) key agricultural services (such as credit, marketing, storage, and processing); and (e) secure tenure arrangements to encourage investment in land and other agricultural assets.²

Most economists agree that successful agricultural development must rely primarily on the market and that most investment decisions will have to be made by the private sector. Most of the issues addressed in this synthesis of the evaluation literature concern the role of the public sector which, among other things, must assure that the private sector can operate effectively.

B. Magnitude of USAID Investments in Agriculture

USAID has obligated substantial resources to support agricultural development in the low income countries during the past 20 years (and more). During several years of the 1980s, USAID investments in agriculture (excluding natural resources and the environment) exceeded \$1 billion (including resources from both the Development Assistance account and the Economic Support Fund).

As a proportion of total Development Assistance, support for agriculture has changed substantially over the years. In 1973 when the "New Directions" legislation was enacted, USAID investments in "food production and nutrition" comprised only about 26 percent of total Development Assistance; in 1974, 35 percent; and in 1975, an estimated 54 percent (A.I.D., 1975). For the next 10 years, from 1975 to 1985, USAID investments in agriculture averaged about 55 percent of total Development Assistance. In 1985, they decreased to less than 50 percent of total Development Assistance for the first time since

¹Three environmental assessments are scheduled for completion in late 1994 and early 1995: Biological Diversity and the Environment; Forestry and the Environment; and Agriculture and the Environment.

²Of course, others have recognized the importance of these same elements, though often by different names. For example, Carroll Streeter identifies eight elements: technology, persuasion, "whole system" effort, land, credit, materials, markets, and organization (Streeter, 1975). Arthur Mosher's "elements for agricultural development" include: land, labor, capital, technology, and organization (Mosher, 1975).

1975; and in 1990, they decreased still further to less than 40 percent of total Development Assistance. They remain at or below that level today.

The composition of USAID investments in agriculture has also changed over time and from region to region. Table 1 and Figure 1 show that total funding for agriculture has been declining in recent years, from \$806 million in FY 1989 to \$589 million in FY 1993. Funding for four of the five components of agriculture has also decreased, all except policy reform and planning.

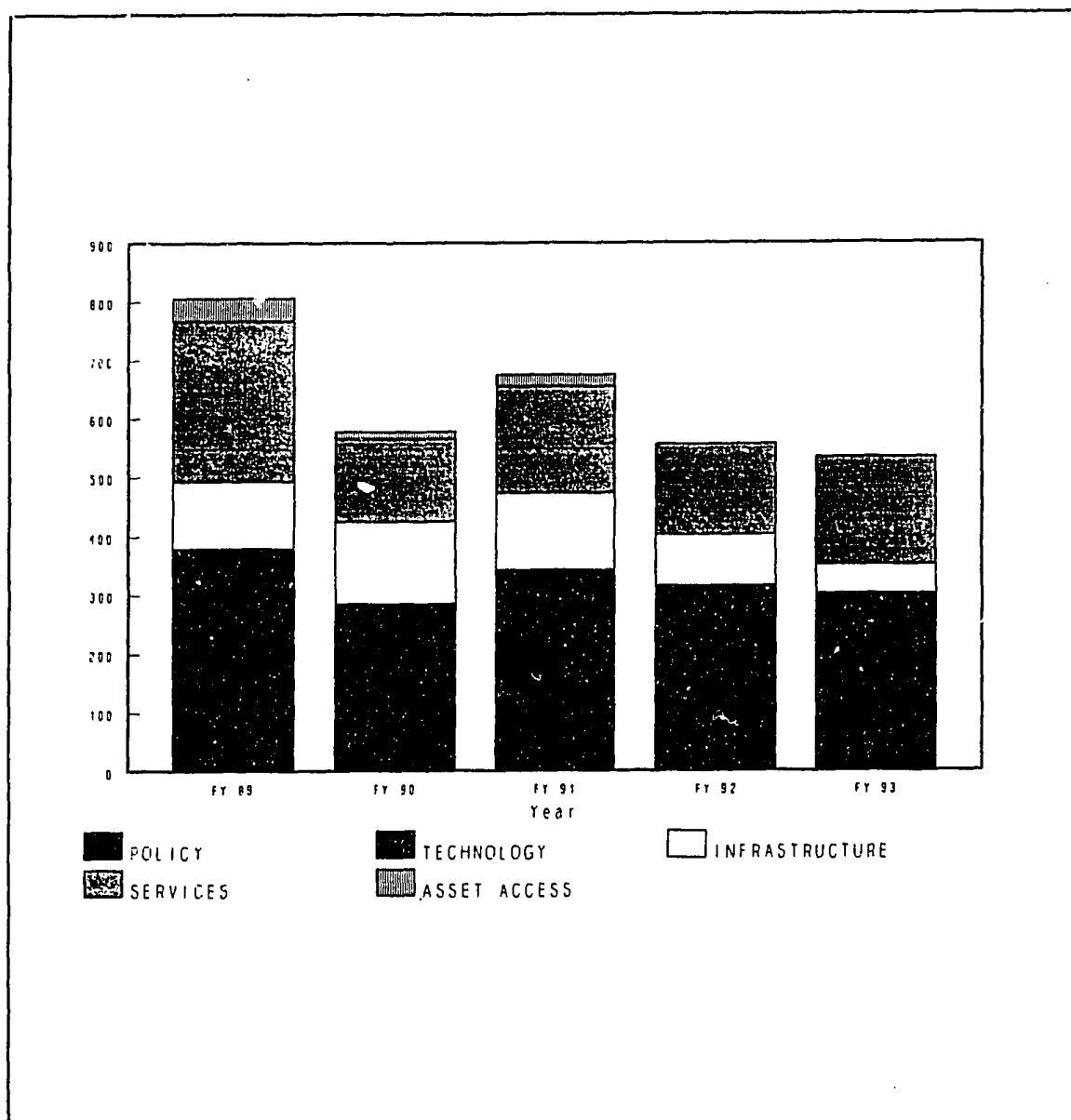
**Table 1. Allocation of USAID Agriculture Resources,
by Sub-sector, in \$ Millions, FY 1989 - FY 1993**

Sub-sector	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Policy Reform and Planning	139	132	166	193	175
Technology Development and Diffusion	239	152	175	121	125
Rural Infrastructure	115	140	131	87	50
Agricultural Services	273	141	182	155	183
Asset Distribution and Access	40	12	20	0	0
Other				70	56
Total	806	577	674	626	589

Source: USAID.

Note: The five sub-sectors are aggregations of investments in certain specific activities tracked by USAID: agricultural management, planning, and policy; agricultural policy reform; agricultural policies and planning; agricultural research; agricultural technology development; research management; agricultural education; agricultural extension education; agricultural training and extension; rural roads; irrigation; rural electrification; agricultural infrastructure; agricultural credit; agribusiness; agricultural marketing; agricultural inputs; pest management; and agricultural land use and planning. "Other" includes investments in crop production, livestock production, and fisheries production.

**Figure 1. Allocation of USAID Agriculture Resources,
by Sub-sector, in \$ Millions, FY 1989 - FY 1993**



Source: USAID. See note for Table 1.

Table 2 presents data on the percentage of total USAID and World Bank funds going to the agricultural sector over the same five year period. It shows that for both donors agriculture's share of total funding has been declining. The decrease is much more dramatic for USAID (from 42 percent to 22 percent of total funding) than for the World Bank (from 16 percent to 14 percent of total funding).

Table 2. Allocation of USAID and World Bank Resources to Agriculture, in \$ Millions and as a Percent of Total Economic Assistance, FY 1989 - FY 1993

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
USAID					
Agriculture Allocation	806	577	674	626	589
Total Assistance(a)	1,929	2,008	2,271	2,380	2,621
Percent of Total	42	29	30	26	22
World Bank					
Agriculture Allocation(b)	3,490	3,656	3,707	3,894	3,267
Total Lending	22,367	20,702	22,685	21,706	23,696
Percent of Total	16	18	16	18	14

Source: (a) USAID Congressional Presentation (Development Assistance program funds) for FY 1992, FY 1993, and FY 1994; (b) World Bank Annual Report for 1991 (179) and 1993 (165).

C. Evaluation Issues

CDIE has carried out evaluative work in most of the five agricultural areas: economic policy reform in Africa (Liebersohn, 1991); agricultural research (Murphy, 1983), agricultural extension (Byrnes, 1990), higher agricultural education (Hansen, 1989); rural roads (Anderson, 1982), rural electrification (Wasserman, 1983), irrigation (Steinberg, 1983); and agricultural services and credit (Solem, 1985). In addition the Agency completed a comprehensive review of land reform (1969) and of agricultural credit (1973). Based on results of these and other evaluations, this study seeks to answer six key questions:

1. Which agricultural investments are most appropriate for various levels of institutional and policy development; is there a logical sequence for investing in the five agricultural sub-sectors?
2. Has successful agricultural development occurred in the absence of investments in one or more of these five areas?
3. Under what conditions have investments in each of the agriculture areas been relatively successful, or resulted in a relatively high economic rate of return?
4. Is the private sector best suited to invest in certain areas (such as agriculture services), and is the public sector best suited to invest in other areas (such as rural infrastructure)?
5. Among the various agencies that implement agriculture activities (including NGOs), are some better suited in certain areas than others?
6. Does the U.S. have a comparative advantage in providing agricultural assistance in some areas compared to others?

The study is premised on the assumption that agricultural growth is essential to sustainable economic development in most low-income developing countries. Thus, these six questions concern the composition of investments in agriculture, not the relative importance of agriculture investments vis a vis alternative (non-agriculture) investments. (Annex A summarizes the role of agriculture in economic growth.)

D. Evaluation Methodology

The study uses the evaluation synthesis methodology, which is designed for the "rapid production of information relevant to a specific program and the analysis of large amounts of sometimes conflicting information on the topic" (GAO, 1992). This methodology involves seven steps as set forth in Annex B.

Part 2 is organized around each of the five elements of agricultural development. (Note,

however, that the institutional aspects of agricultural development included in the fifth element concerning Asset Distribution and Access is not covered in this study.¹⁾ In each case, the element is defined in general, programmatic terms (not in technical terms); the magnitude of funding levels for various donors is reported (to the extent data are available); and the overall impact of past investments in each sub-sector is assessed. Part 3 is organized around each of the six questions identified above. Part 4 suggests management implications.

Three caveats should be kept in mind. First, the desk study, and the methodology on which it is based, are deliberately designed to permit broad generalizations in answer to the six questions; clearly, there will be exceptions to these broad generalizations in specific country situations. Second, the desk study, because it is based primarily on past evaluations, is not expected to generate new knowledge; but by synthesizing a vast body of existing knowledge, it is expected to yield new insights. Third, the background papers on which the study is based were completed in a relatively short period of time (generally seven weeks), and this constitutes another limitation.

¹Investments to strengthen farmer organizations, water user organizations, non-governmental organizations, cooperatives, and other local institutions that emphasize participation and decentralization are typically designed to help ensure farmers' access to land and related agricultural assets. In spite of the clear link between local organizations and land tenure programs, it became apparent that the subject of local institutions was important enough to merit a separate treatment. Unfortunately, a sixth background paper was not commissioned in time to be included in this synthesis.

2. THE FIVE ELEMENTS OF AGRICULTURAL DEVELOPMENT

A. Agricultural Policy Reform and Planning¹

1. What Is Policy Reform and Planning?

This first element of agricultural development is generally comprised of two major kinds of investments: (a) "balance of payments support" (capital transfers) to encourage and/or support economic policy reform; and (b) technical assistance and training in economic planning and policy analysis.

Balance of payments support consists of resources (cash or commodities) provided to host country governments to support their efforts to change (liberalize) their economic policies, including their agricultural policies. The objective of such support is both to "leverage" significant changes in economic policies as well as to "cushion" against the adverse, and often times politically unpopular, short-term effects of these changes. Technical assistance and training for planning and policy analysis has commonly supported policy analysis units established in ministries of agriculture, planning, and finance. The objective of such policy analysis units is to provide decision-makers with comprehensive policy options derived from improved analytical expertise.

Donor attempts to induce economic policy changes in developing countries with capital transfers are described in various ways. Some observers have characterized these programs as "trading cash for policy reform;" others say that they serve to facilitate reforms by "cushioning" populations from the negative side effects of economic changes. Generally, adjustment operations that "cushion" or facilitate on-going reforms have met with more success than those that attempted to "buy" new reforms. Similarly, "policy dialogue," which consists of congenial attempts to convince governments to enact reforms, has met with more success than "policy conditionality," which consists of more explicit leveraging, with governments agreeing to policy changes in response to positive or negative incentives by the donor (Casen, 1986).

Some adjustment operations focus on macroeconomic reforms that indirectly affect agriculture, such as adjustments in the foreign exchange rate to shift the terms of trade in favor of agriculture; others focus directly on agricultural policy issues such as lifting agricultural price controls. The IMF and the World Bank are the major providers of adjustment assistance in macroeconomic affairs; the World Bank and to a lesser extent

¹This section is based on a synthesis prepared by Scott Simons and Lawrence Kent, "Agricultural Policy Reform and Planning," October 1993.

USAID are the major providers of adjustment assistance specific to agriculture. USAID has been the lead donor in establishing and developing planning and policy analysis units.

2. Historical Context

Policy dialogue and policy conditionality have been in the limelight over the past dozen years or so, but donor conditionality has a history that goes back further than 1980, especially in India and Latin America.

In the case of India, American officials in 1965 "thought that Indian [agricultural] policies needed changing and that it was appropriate to use transfers, especially of the nonproject kind, to encourage such changes" (Lewis, p. 15). Accordingly, the U.S. Government demonstrated its disapproval of India's approach to agriculture by withholding PL 480 food assistance upon which India depended. Only after India formally adopted a new agricultural strategy along the lines suggested by American officials did President Lyndon Johnson authorize the release of the PL 480 food assistance and the resumption of nonproject lending (with a \$50 million fertilizer loan). In retrospect, it is clear that the agricultural policy reforms in India were important and that their adoption owes much to U.S. pressure. However, the Indians resented being pressured into reform, especially because the PL 480 shipments which were withheld were matters of life and death during the drought years of the mid 1960s (Lewis, p. 29).

The experience in Latin America with the Alliance for Progress parallels the Indian experience in some ways. However, most of the conditionality associated with the Alliance supported stabilization measures and other macroeconomic reforms; agriculture was addressed only indirectly. According to most observers, the results were poor. Berg, for example, notes that "few traces of the exercise were visible by the end of the decade" (Berg, 1991, p. 216), and Heller and Wionczek write that the "Alliance experience can be interpreted as an overwhelming repudiation of the general efficacy of the assumption [that conditionality can work]" (Heller and Wionczek, 1988, p. 134).

Disappointment with both the Indian experience and the Alliance's macroeconomic focus prompted USAID to shift away from conditionality and toward specific investment projects in the 1970s (Weintraub, 1989, p. 24). In fact, most donor projects during this decade "were conventionally designed to work within rather than to change the domestic policy environment . . ." (FAO, 1989, p. 33).

The project mode, however, had revealed its limitations by the end of the decade. By 1980 donors began to reach a consensus that the policy environment was so negative in so many developing countries that it was necessary to engage again in policy dialogue to promote reform and adjustment. The World Bank developed new loan instruments for this function: structural adjustment loans (SALs) were used for the first time in 1980, and sectoral adjustment loans (SECALs), in 1983. The IMF increased its conditional lending to developing countries through its Structural Adjustment Facility (SAF) and Enhanced

Structural Adjustment Facility (ESAF). And USAID again began to provide policy-conditioned assistance, much of it focusing on agricultural issues, using cash transfers, food aid, and commodity import programs to promote policy changes.

3. USAID and World Bank Funding of Agricultural Policy Reform and Planning

Table 3 summarizes USAID and World Bank investments in agricultural policy reform and planning activities from 1960-1993.

Since 1960 USAID has invested approximately \$2.7 billion in 221 agricultural policy reform and planning activities worldwide. About three-fourths of the activities have been projects designed to develop capacity in policy analysis and planning. Such projects accounted for about \$660 million of the total expenditure. A much greater proportion of expenditures, approximately \$2 billion (including PL 480 programs), was committed to programs employing conditionality (including "hybrid" projects that focused on both planning and policy reform). Most of the Agency's agricultural adjustment programs (37 of 52) have been concentrated in Africa, where most USAID-recipient countries are located and where the need for adjustment programs is greatest. In contrast, USAID's capacity building projects are distributed more evenly among Africa, Asia and the Near East, and Latin America and the Caribbean.

The World Bank has invested over \$5 billion in agricultural adjustment operations (SECALs) over the past decade or so that stress policy conditionality. In addition, the Bank has invested over \$15 billion in structural adjustment loans (SALs) since 1980; 60 percent of these SALs contain conditionality that relates to agricultural pricing (Knudsen and Nash, 1991).

4. The Impact of Investments in Agricultural Policy Reform and Planning

Results of World Bank Adjustment Operations. Knudsen and Nash reviewed 79 World Bank-financed adjustment operations in agriculture. They show that agricultural pricing conditions (usually, increases in producer prices) were incorporated into most SALs (about 60 percent) and virtually all SECALs. In addition, of the 79 SALs and SECALs, 48 percent included macroeconomic policy conditions that were related to agriculture (usually, exchange rate reform). These conditions were successfully implemented in about 69 percent of the cases. However, the study does not report on what the impact was of having successfully implemented these conditions. It (like most other studies) simply suggests that agricultural growth increased more in countries receiving adjustment loans than in comparable countries that did not receive adjustment loans (Knudsen and Nash, 1991).

McCleary reports that about 60 percent of the policy changes agreed to as conditions of SALs and SECALs were fully implemented. Among the areas where implementation was most successful were agricultural pricing policies and exchange rate policies, which are critical to improving agricultural terms of trade (McCleary, 1991). Again, the actual impact

Table 3. Investments in Agricultural Policy Reform and Planning, USAID and World Bank, by Region, in \$ Millions, 1960-1993

Activity	Africa	Asia/NE	LAC	Total
USAID				
Capacity Building ^a	53 projects \$159.8	39 projects \$402.1	77 projects \$102.4	169 projects \$664.2
Adjustment Programs ^b	37 programs \$727.5	8 programs \$859.0	7 programs \$443.8	52 programs \$2,030.0
World Bank				
Adjustment Operations ^c	21 SECALs \$1,500.0	6 SECALs \$1,200.0	10 SECALs \$2,600.0	37 SECALs \$5,300.0
	45 SALs \$5,100.0	28 SALs \$8,200.0	23 SALs \$2,400.0	96 SALs \$15,700.0

Note: All figures are estimates and may not account for the universe of projects and programs in agricultural policy reform and planning; funding figures, in particular, are likely to be conservative.

of the policy reforms is not reported.

A World Bank report by Humphries and Jaeger compares the agricultural performance of African countries that have undertaken donor-assisted structural adjustment with countries

^aTilney and Block, 1988a, Table 1 (for most projects implemented between 1970 and 1984). A.I.D., 1993, Annex B (for most projects implemented between 1984 and 1991). The funding reflects only USAID grants and loans, not funds from host countries or other sources. Funding information was not available for a number of projects, and therefore, the level of project funding is underreported in the table.

^bA.I.D., 1993, Annex B (for activities implemented between 1980 and 1991); Tilney and Block, 1991, Exhibit 2.2. This category includes "hybrids" such as the African Economic Policy Reform Program (AEPRP).

^cWorld Bank, 1992a, Table A1.5. Agricultural sector loans include Agriculture SECALs. Data are for all SALs, although only 60 percent of SALs have agriculture pricing components.

that have not. They show that devaluation and other policy reforms resulted in increased real producer prices for export crops by nearly 50 percent between 1980 and 1986; in non-reforming countries, the increases were small. Similarly, the growth rate of agricultural production more than doubled between 1980-84 and 1985-87 in countries that adopted important reforms; in countries without such reforms, agricultural growth rates stagnated at the low levels that prevailed for both groups of countries in the early 1980s (Humphries and Jaeger, 1989).

Cleaver comes to similar conclusions: aggregate agricultural production was significantly higher in adjusting countries than in other countries, suggesting that, overall, "where policy is good or improving, performance of agriculture is also good or improving" (Cleaver, 1988, p. 49). Table 4 suggests a clear relationship between adjustment operations and agricultural growth in Africa.¹

Table 4. Average Agricultural Growth Rates in Africa, 1980-90 and 1987-90, in Adjusting and Non-adjusting Countries

Countries	1980-1990	1987-1990
Countries Adjusting Intensively, 1987-1990 (13) ^a	2.7	3.7
Countries Adjusting, but Less Intensively, 1987-1990 (15) ^b	2.7	2.2
Non-adjusting Countries (5) ^c	Negative	0.5

Source: Cleaver, 1988, p. 50.

¹These results have been reconfirmed in the most recent and most detailed World Bank study on the subject, Adjustment in Africa: Results to Date and the Road Ahead (Washington, D.C.: World Bank), April 1994.

^aCote d'Ivoire, Ghana, Guinea-Bissau, Kenya, Madagascar, Malawi, Mauritania, Mauritius, Nigeria, Senegal, Tanzania, Togo, and Zambia.

^bBenin, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Gabon, The Gambia, Mali, Niger, Sierra Leone, Somalia, Sudan, Zaire, and Zimbabwe.

^cBotswana, Ethiopia, Lesotho, Liberia, and Rwanda.

The close relationship between the macroeconomic environment and agricultural development is highlighted in a comparative study led by Anne Krueger of agricultural price interventions in 18 developing countries. The study concluded that during the 1980s policy discrimination against agriculture in developing countries was caused mainly by currency overvaluation. The indirect tax on agriculture from macroeconomic and industrial protection policies was about 22 percent, on average, for the 18 countries over the 25 year period 1960 to 1985 -- nearly three times the direct tax on agriculture from agricultural pricing policies, which was about 8 percent (Krueger, Schiff, and Valdes, 1988, p. 200). The World Bank concluded that macroeconomic reform is essential for agricultural development, and that donor attempts to leverage macroeconomic policy reform are as important to agriculture as are their attempts to influence agricultural policy directly (World Bank, 1990b, p. 110).

In 1992 the World Bank's internal evaluation unit reviewed the performance of seven completed agricultural SECALs with commitments totalling \$988 million (of which \$52 million was eventually canceled): three in Africa, two in Latin America, and one each in Asia and the Middle East. Only two were deemed sustainable, and none was judged to have attained its institutional objectives in a substantial way. The review concluded that sector operations whose effectiveness is subject to macroeconomic policy reforms, as is often the case with the agriculture sector, should not be expected to produce results unless both the macro and sectoral reforms are carried out simultaneously (World Bank, 1993a, p. 26).

Uma Lele concludes that the World Bank has had limited success in convincing countries to undertake changes that the countries themselves have strongly opposed. For example: Kenya has been reluctant to liberalize grain marketing; Tanzania, to adjust the foreign exchange rate; Malawi, to limit the licensing of land for estates; and Senegal and Nigeria, to remove their fertilizer subsidies (Lele, 1991).

Overall, most of the literature on World Bank investments in adjustment operations in agriculture indicates that results have been fair to good. Knudsen and Nash's work shows that 68 percent of agricultural pricing conditionalities have been met, and Jaeger and Cleaver's work indicates that, on average, reforms pay dividends. Still, as Nural Islam points out, most studies deal insufficiently with the impact of these reforms on agricultural performance and instead focus simply on whether or not the reforms were implemented. He writes: "Still urgently needed is an empirical analysis of how the reforms were actually implemented and what their impact was on the agricultural sector" (Islam, 1991).

Results of USAID Adjustment Operations. After the somewhat disappointing experience with policy conditionality in India and under the Alliance for Progress in the 1960s, USAID generally shied away from policy dialogue in the 1970s. Things changed in the early 1980s as USAID began to focus on free markets and the economic policies necessary to make them work.

Tilney and Block examined 19 USAID-financed initiatives in agricultural policy and planning that were implemented in the 1980s. Of the 19, six focused exclusively on capacity building;

three, exclusively on policy reform; and 10 were "hybrids," focusing on both capacity building and policy reform. Only 39 percent succeeded in inducing policy reform. Of the 13 policy reform programs and "hybrids" (that is, excluding the six capacity building projects), 50 percent were successful in inducing policy reforms (Tilney and Block, 1991).

Wolgin looked at USAID's experience with agricultural policy reform in Africa. Between 1984 and 1989 USAID funded 42 separate policy reform programs in 22 different countries totaling over \$760 million. Of these 42 programs, 17 were designed specifically to support agricultural policy reform (Wolgin, 1990). These agricultural policy reform programs attempted to liberalize agricultural output markets and fertilizer markets. In many cases the results were positive:

- In Mali, the operating deficit of the cereals marketing board was reduced, grain storage losses were reduced, private trade in cereals was expanded, and rural consumers gained improved access to cereals.
- In The Gambia, rice prices were decontrolled, private importation of rice and trade in rice were legalized, and the export tax on groundnuts was eliminated; these measures resulted in reduced government subsidies and expanded rice supplies.
- In Madagascar, rice marketing was liberalized; as a result, the farmer received, on average, 66 percent of the retail price after the reform compared to only 41 percent of the retail price before the reform.
- In Mozambique, the government was persuaded to eliminate price and trade controls on fruits, vegetables, roots, and tubers; as a result, real producer prices increased and real consumer prices declined.
- In Cameroon, fertilizer subsidies were cut by 75 percent, and marketing margins declined from \$283 per ton in 1987 to \$49 per ton in 1989; the reforms established a private market for the import, distribution, and financing of fertilizer, thereby ending the government's complete control.
- In Uganda, the policy reform measures provided incentives to exporters to purchase nontraditional export commodities; the result was a doubling of exports (in value terms) between 1988 and 1990.

At the same time, some programs were relatively unsuccessful or even outright failures:

- In Zambia, USAID suspended the second tranche of its planned contribution to a World Bank program designed to eliminate food and fertilizer subsidies when the government abandoned the program.
- In Togo, an export liberalization program had minimal impact.

- In Malawi, results were mixed. USAID failed to persuade the government to reduce fertilizer subsidies permanently, and they rebounded to earlier levels after only two years. On the other hand, USAID succeeded in promoting a shift in the mix of imported fertilizers. As a result, fertilizer nutrient sales increased by 100 percent from 1985 to 1990, even though the tonnage increased by only 55 percent; the shift to high concentration fertilizers saved \$18 million in transportation and fertilizer costs.
- In Guinea, a program that was designed to privatize two parastatals involved in the distribution of fertilizer and other agricultural inputs failed.
- In Kenya, although the government was persuaded to decontrol fertilizer prices and reduce its role in fertilizer distribution, it could not be persuaded to withdraw completely from the system.

Lieberson also evaluated USAID's experience with policy reform in Africa, where, from 1985 through 1990, USAID committed \$308.8 million to 19 countries under the African Economic Policy Reform Program (Lieberson, 1991). Like Wolgin, Lieberson reports generally positive results of USAID adjustment programs. However, empirical evidence concerning the actual impact of these results is limited to that summarized above. Overall, it appears that USAID support was successful and accelerated the process of liberalization in the agricultural sector in those countries where the government was genuinely committed to reforms.

Results of USAID Planning and Policy Analysis Activities. Over the past 30 years, USAID has been the principal bilateral donor funding projects to help build local capacity in agricultural planning and policy analysis. From 1979 to 1984 USAID sponsored at least 129 agricultural policy and planning projects with total funding of \$475 million (of which USAID contributed \$278 million)¹. Table 5 shows the regional distribution of 124 of these 129 projects, those for which funding information was available. These projects were designed to improve institutional capacity and to provide the analytical basis for policy reform (as distinct from actually supporting policy reform).

Institution Building. In their extensive review of 129 projects, Tilney and Block analyzed 61 on the basis of formal evaluations. Of the 61 projects, 58 (or 95 percent) were judged to have had successful capacity building impacts -- in terms of creating a policy analysis or planning unit, adding new qualified staff, or upgrading existing staff -- and 24 projects (or 39 percent) had distinct impacts on decision makers (Tilney and Block, 1988b, pp. 8-10).

¹During the longer period 1960 to 1993, USAID funded a total of 169 planning and policy analysis projects with total expenditures of \$664.2 million; see Table 3.

**Table 5. USAID Investments in Planning and Policy Analysis,
by Region, in \$ Millions**

Region	Number of Projects	Expenditures
Africa	40	193
Asia	16	120
Near East	5	68
Latin America/Caribbean	63	94
Total	124	475

Source: Tilney and Block, 1988c, pp. 3-4.

Their more detailed examination of 15 capacity building projects showed that seven had a high degree of success (Pakistan, The Gambia, Zambia, Egypt, Sri Lanka, Peru, and Morocco), and eight were less successful (Indonesia, Togo, Ecuador, Kenya, Niger, Sudan, Dominican Republic, and Zaire) (Tilney and Block, 1988b, pp. 8-10). Only one of the 15 (The Gambia) had a high degree of decision maker impact; projects in Ecuador and Togo had little impact at all (Tilney and Block, 1991, p. 10).

The evaluation literature identifies six factors that have contributed to successful institution building in policy analysis and planning projects: (a) project staff (both expatriate and host country) are competent; (b) incentives are in place to recruit and retain qualified host country staff; (c) the right kind of training (including on-the-job training) is provided and well qualified trainees are selected; (d) physical equipment, such as computers, is provided; (e) the analytical work addresses the country's policy needs; and (f) the results of the analyses are widely disseminated.

Too often these factors are not present. For example, in identifying expatriate staff, donors often give too much emphasis to technical skills and too little emphasis to teaching and management ability; host countries often select counterparts on political grounds rather than on professional grounds; civil service pay scales are not sufficiently high to attract and retain qualified analysts; trainees are often selected not on the basis of qualifications, but on the basis of influence; and on-the-job training is inadequate, which institutionalizes a dependence on the expatriate personnel.

Policy Reform. USAID's planning and policy analysis projects appear to have had less success in achieving policy change than in achieving their institution building objectives.

Of the 61 projects evaluated, only 20 (one-third) contributed to actual changes in policies or programs. Their effectiveness in changing policies varied considerably among regions: in Asia and Latin America and the Caribbean, 42 percent of the projects had policy impacts -- almost double the 22 percent that had policy impacts in Africa; there were no policy impacts from projects in the Near East (Tilney and Block, 1988b).

The absence of actual policy change does not necessarily mean that the policy analysis and planning activities failed. Even with the highest quality analysis and the best decision maker access, policies may not change. Thus, while only one-third of the projects produced concrete policy change, most of the remaining two-thirds may still have been successful in producing high quality analysis and in providing useful input to decision makers.

Four key factors are identified in the evaluation literature that are associated with projects that actually induce policy change: (a) the host country supports the policy change; (b) the analysis meets the needs of the policy makers by focusing on immediate policy issues and by providing direct, practical, and implementable recommendations; (c) the policy analysis unit tends to be located close to senior decision-makers; and (d) the policy advisors perform high quality policy analysis and have credibility with (and access to) policy makers.

Sometimes these factors are not present. For example, analyses that challenge prevailing governmental policies, or expose the limitations of existing policies, are often strongly resisted by governmental leaders and are unlikely to produce short-term results; large, quantitative, highly abstract modeling exercises have little pay-off in the form of policy change because they fail to meet the tests of practicality and relevancy; and policy analysis units are often isolated from the entity having prime authority in setting agricultural policies, which is oftentimes a ministry such as finance or planning.

Among the planning and policy analysis projects which were clearly successful are the following:

- The Gambia, where there was a high degree of decision maker impact.
- Zambia, where virtually all trainees returned to responsible policy and planning positions and the analytical unit participated in the decision making process -- which included making recommendations that resulted in price increases for groundnuts and reductions in tractor rental subsidies.
- Sri Lanka, where policy analysts had access to decision makers; the analytical agenda was set to meet government's needs; and analyses were practical, resulting in a list of specific policy changes along with steps for successful implementation.
- Peru, where the analytical unit participated in the decision making process by focusing on current, high priority policy issues and studies that provided support for several ministerial decisions.

- Bangladesh, where there has been strong decision maker impact.
- Botswana, with relatively successful on-the-job training.
- Dominican Republic, where the Agricultural Studies Unit participated in the decision making process and where the policy studies were responsible for decisions to raise the producer price of milk, extend credit risk coverage to local banks, and decontrol pork prices.

Other planning and policy analysis projects were less successful:

- Indonesia, Togo, and Ecuador where there was little impact on decision makers.
- Kenya, where there was strong decision maker impact, but where poor on-the-job training created a dependence on the technical assistance.
- Zaire, where accomplishments were close to nil (Bucknall and Gutman, 1989, p. 20).

B. Agricultural Technology Development and Diffusion¹

1. What is Technology Development and Diffusion?

Technology development expands currently known agricultural techniques. It starts with agricultural research to develop new technology. Various extension, or diffusion, techniques transfer the newly available production technology to farmers.

Successful technology development and diffusion contributes to agricultural growth, which is typically measured by an increase in the value of agricultural output. The increase in value is usually due to an increase in the production of goods and services or to an increase in productivity (the output of goods and services per unit of conventional inputs). In addition to contributing to increased agricultural growth, successful technology development and diffusion also contributes to consumer welfare. Techniques that increase the quantity produced often lower the market price for the agricultural output. Theoretical and empirical evidence shows that the majority of the benefits from agricultural technology development and diffusion accrues to consumers (Norton and Davis, 1981; Hayami and Herdt, 1977).

Education (resident instruction) is the third component (in addition to research and extension) that comprises the tripartite U.S. land grant model of agricultural technology development

¹This section is based on a synthesis prepared by James F. Oehmke, "Issues of Agricultural Technology Development and Diffusion: A Synthesis of the Literature," January 1994.

and diffusion. Two types of education affect technology development and diffusion: (a) the education of farmers, and (b) the higher education of scientists and researchers. USAID investments have focused on the latter.

2. Funding of Agricultural Technology Development and Diffusion

Table 6 shows that public expenditures on agricultural research in developing countries have increased from about \$2.5 billion per year in 1971-75 to over \$4.3 billion per year in 1981-85 (in 1980 dollars). Expenditures have been (and continue to be) substantially greater in the Asia/Near East region than in either the Africa or Latin America/Caribbean regions.

Table 6. Annual Public Expenditures on Agricultural Research, by Region, in 1980 \$ Millions, 1971-1985

Region	1971-75	1976-80	1981-85
Sub-Saharan Africa	277	359	372
Asia/Near East	1,788	2,546	3,253
Latin America/Caribbean	487	679	709
Total	2,552	3,584	4,334

Source: Pardey and Roseboom, 1989.

Table 1 shows that USAID obligations to support agricultural technology development and diffusion have decreased by almost 50 percent between FY 1989 and FY 1993, from about \$239 million to about \$125 million. Oehmke and Crawford estimated USAID obligations in Africa, where expenditures on agricultural research are already relatively low, at \$30 million in 1991, down from \$55 million in 1986.

In 1952, the U. S. began investing in the development of agricultural universities in developing countries. By 1989, such assistance had been provided to 64 universities in 40 countries. Table 7 shows that the majority of the agricultural university development projects (50 out of 64) were initiated in the 1950s and 1960s. Projects were concentrated in Asia in the 1950s, but were more regionally balanced in the 1960s. This type of investment was virtually abandoned by the U.S. in the 1970s, but made a small comeback in the 1980s; however, the average size of these later projects was much smaller.

Table 7. Number of USAID-supported University Development Projects, by Region and Decade of Initiation

Decade Project Began	Africa	Asia/Near East	Latin America/ Caribbean	Total
1950s	1	18	6	25
1960s	9	8	8	25
1970s	0	2	1	3
1980s	4	5	2	11
Total	14	33	17	64

Source: Oehmke, pp. 7-8.

Typically, a host country university was paired with a U.S. land grant university. Universities from 36 different U.S. states were used as contractors, and these universities helped to instill the tripartite institutional model (comprising research, extension, and education) common in the U.S. In many of the 40 countries, substantial progress was made. However, many of the new institutions were never able to implement the farmer-controlled land-grant model, partly because the U.S. system did not match the institutional models that had been inherited under former European colonial rule (particularly from the British and French).

3. The Impact of Investments in Agricultural Technology Development and Diffusion

A single finding from the evaluation literature on technology development and diffusion overwhelms all others: investments in this area have generated high economic rates of return, indicating that the social benefits of the investments justify the costs -- in virtually all countries, for a wide variety of commodities, and under diverse agronomic and climatic conditions.

USAID evaluations usually do not calculate rates of return to investments in this area; and World Bank projects in this area are accorded specific exclusion from usual Bank practice which is to calculate rates of return. However, a considerable academic literature has evolved over the past three decades. Tables 8, 9, and 10, one for each of the three major regions of the developing world, present results that substantiate the assertion above.

**Table 8. Africa:
Economic Rates of Return to Investments in Agricultural
Technology Development and Diffusion, Selected Countries and Crops**

Country	Commodity	Years	Extension Costs (?)	Rate of Return
Kenya	Wheat	1922-1980	?	33%
Kenya	Maize	1955-1988	?	40%-60%
Zambia	Maize	1978-1991	Yes	84%-87%
Ghana	Maize	1982-1992	?	74%
Malawi	Maize	1957-1992	?	4%-7%
Senegal	Cowpea	1980-1985	?	31%-92%
Niger	Cowpea/Millet /Sorghum	1975-1991	Yes	Negative
Cameroon	Cowpea	1979-1991	Yes	3%
Cameroon	Sorghum	1979-1991	Yes	Negative
Mali	Maize	1969-1991	Yes	135%
Africa	Maize/Staple Crops	1962-1980	?	30%-40%

Source: Oehmke, J. F., 1992.

Because these studies were done by different analysts, the methodologies varied somewhat. For example, some analyses were for a single crop, while others were for an aggregate of several (or all) crops in a country, thereby removing any bias toward selecting only successful ventures. Some included the cost of extension, and others did not. The time period varied from study to study; the longest time period ever studied was from 1800 to 1938 in Japan, where the economic rate of return was 35% for aggregate investments in agricultural technology development and diffusion. In most cases the analysis covered the entire country, but in some cases it covered only a region of a country and in others it covered several countries. Some analyses were ex ante, but most (including all of those in Table 8, 9, and 10 above) were ex post.

For virtually all of the studies, the economic rate of return exceeded the opportunity cost of

**Table 9. Asia and the Near East:
Economic Rates of Return to Investments in Agricultural
Technology Development and Diffusion, Selected Countries and Crops**

Country	Commodity	Years	Extension Costs (?)	Rate of Return
Japan	Rice	1915-1950	?	25%-27%
Japan	Rice	1931-1960	?	73%-75%
Philippines	Rice	1966-1975	?	75%
Philippines	Maize	1956-1983	No	27%-48%
Philippines	Maize	1956-1983	Yes	27%-43%
Bangladesh	Rice and Wheat	1961-1977	?	30%-35%
Pakistan	Wheat	1967-1981	?	58%
Pakistan	Maize	1967-1981	Yes	19%
Indonesia	Rice	1965-1977	?	133%
India	Aggregate	1953-1971	Yes	40%

Source: Adapted from Echeverria, 1990, and Daniels et al, 1992.

capital -- what the money could have earned in the next best investment -- indicating that the investments were economically justified. For Africa (Table 8) , although most of the studies showed that investments in agricultural research were justified, there were some exceptions. In fact, the negative rates of return found in a few studies were unique to Africa.

The findings of high returns across most countries and commodities has led most reviewers to conclude that investment in agricultural research is worthwhile (Evenson, Waggoner and Ruttan, 1979; Ruttan, 1982; Echeverria, 1990; Norton and Davis, 1990). Still, skeptics have raised legitimate methodological questions:

- Some have argued that the studies examined only the success stories, and consequently did not account for the costs of failed research programs. But even when failed programs are included in aggregate studies, which include all benefits and all costs, rates of return remain high.

**Table 10. Latin America:
Economic Rates of Return to Investments in Agricultural
Technology Development and Diffusion, Selected Countries and Crops**

Country	Commodity	Years	Extension Costs (?)	Rate of Return
Mexico	Wheat	1943-1963	?	90%
Mexico	Maize	1943-1963	?	35%
Peru	Maize	1954-1967	?	35%-40%
Colombia	Rice	1957-1972	?	60%-82%
Colombia	Wheat	1953-1972	?	11%-12%
Brazil/Central	Rice	1959-1978	Yes	87%
Brazil/Embrapa	Wheat	1974-1982	?	59%
Chile	Wheat	1949-1977	?	21%-28%
Chile	Maize	1940-1977	?	32%-34%
Uruguay	Rice	1965-1985	Yes	52%
Bolivia	Wheat	1966-1975	?	48%
Argentina	Aggregate	1950-1980	Yes	41%

Source: Adapted from Echeverria, 1990, and Daniels et al, 1992.

- Some have argued that the early studies failed to account for the effect of technology development and diffusion on prices, suggesting that successful programs lowered prices which would reduce benefits to farmers. However, when price effects are accounted for properly, the lower prices typically benefit consumers more than they harm producers (Hayami and Herdt). In any event, this is an issue of transfers, not an issue of real returns to society.
- Others have argued that the effect of research was hard to distinguish from that of extension and complementary activities, but high rates of return are robust even when the costs of extension and complementary inputs are accounted for.
- Still others point out that average rates of return do not show that the last dollar spent

on research was productive; for example, they do not show that a successful program costing \$5 million would not have been just as successful at a budget of \$4.5 million. The more recent studies have used the marginal approach, but even for the earlier studies, there is no easily discernible difference in results between average rates of return compared to marginal rates of return.

As expected from the high rates of return to investments in technology development and diffusion, there has been a substantial spread of improved agricultural technologies, even in Africa.

- In Zambia, a new hybrid maize variety (MM752) was released in 1983 that demonstrated a 20 percent yield increase over the then popular variety (SR52). Aided by favorable pricing policies, adoption of the new variety reached 50 percent of total maize area by 1988-89; yield increases of 15 to 20 percent were achieved on a national level; and output more than doubled. Then, despite a reversal in pricing policies, adoption of the new variety increased to 58 percent of total maize area in 1990-91, and to 61 percent in 1991-92.
- In Malawi, adoption of a new maize variety with a 100 to 200 percent yield advantage over the 1 ton/hectare yields of local varieties increased from about 5 percent of total maize area in 1985-86 to almost 15 percent in 1991-92.
- In Ghana, adoption of improved maize varieties increased from 20 percent of the total area planted to maize in 1982 to 55 percent in 1991, contributing to an increase in production from 265,000 tons in 1982 to 932,000 tons in 1991.
- In all of sub-Saharan Africa, 35 to 50 percent of the total maize area was planted to improved varieties in 1992 (Byerlee, 1992).
- Cowpea varieties released since 1982 have been adopted on 100 percent of the cowpea area in the Guinean zone of Burkina Faso and 95 percent of North-Central Mali (Sanders, 1993).

4. State of Agricultural Technology Development and Diffusion

Two main indicators of the state of agricultural development and diffusion are: (a) changes in on-farm yields; and (b) the gap between on-farm yields and potential yields. From 1960/61 to 1990/91, average yield increases for the major staple crops (rice, wheat, and maize) have been substantial, doubling in many parts of the world. In fact, yields of all three crops more than doubled in the Far East.

Table 11 shows that over this 30 year period rice yields increased by 78 percent worldwide, and in the Far East they more than doubled. They increased least in Africa; in fact, rice yields in the other regions of the world were higher in 1960/61 than they were in Africa in

1990/91, 30 years later. (In Cameroon, however, rice yields increased over fourfold). Similarly, wheat yields more than doubled, even in Africa. However, in Africa they remain substantially below yield levels in the other parts of the world. Finally, maize yields also increased dramatically, even in countries which had already adopted hybrids prior to 1960 (such as the United States). Again, Africa has shown the least progress. These yield increases are attributable largely to: (a) improved varieties resulting from agricultural research (especially those that are responsive to water and fertilizer, such as "green revolution" rice and wheat in Asia); (b) development of irrigation; and (c) increased use of chemical fertilizers.

Table 11. Average Yields (kg/ha) for Rice, Wheat, and Maize, by Region, 1960/61 and 1990/91

Region	Rice		Wheat		Maize	
	1960/61	1990/91	1960/61	1990/91	1960/61	1990/91
Africa	1,120	1,602	595	1,394	900	1,174
Latin America	1,790	2,634	1,095	2,080	1,165	2,008
Far East	1,700	3,558	840	2,594	930	3,316
Near East	2,875	4,564	950	1,844	1,550	4,383
North America	3,835	6,248	1,520	2,408	3,285	7,116
World	1,980	3,516	1,230	2,526	2,055	3,712

Source: FAO, Production Yearbook, Vols. 15 and 45, (Rome: FAO), 1961 and 1991.

Despite these successes, average yields for these staple crops are still well below potential; that is, there is still a gap between on-farm yields and potential yields. Among the developing countries, the gap appears to be greatest in Africa.

C. Rural Infrastructure¹

1. What is Rural Infrastructure?

Infrastructure development essentially means the creation of public goods (which are also durable capital goods). These public capital goods normally produce external economies and social benefits (as distinct from private benefits). As a result, when one individual uses the services provided by these public goods, that does not prevent other individuals from using and benefiting from the same services.² Examples of public capital goods, or physical infrastructure, include public utilities (water works, telephone, electricity); transport facilities (roads, bridges); and health and education facilities (hospitals, schools). Infrastructure is sometimes referred to as social overhead capital.

Four characteristics help to distinguish infrastructure, which contributes indirectly to economic growth, from directly productive investments: (a) the services provided by infrastructure facilitate, or are in some sense basic to, the carrying out of a wide variety of economic activities; (b) they are provided in practically all countries by public agencies or by private agencies subject to public control, and therefore, they are provided free of charge or at rates that are publicly regulated; (c) the services cannot be imported; and (d) investments in infrastructure tend to be indivisible or lumpy.

Because infrastructure typically contributes indirectly, rather than directly, to economic growth, it is difficult to measure its contribution to economic growth. For this reason, it is also difficult to determine what level of resources should be allocated to infrastructure activities vis-a-vis directly productive activities.

Infrastructure, whether for agriculture or industry, rural areas or urban areas, provides the basic environment for investments in directly productive activities. Ahmed and Donovan³

¹This section is based on Raisuddin Ahmed and Cynthia Donovan, Issues of Infrastructural Development: A Synthesis of the Literature (Washington, D.C.: IFPRI), November 1992. Their synthesis focuses on physical infrastructure (as distinct from institutional infrastructure) and is based on a review of 185 documents, including research studies, project evaluations and appraisal reports, and other books and articles.

²Public goods, in contrast to market goods, are nonexclusionary or nonrival or both. When goods are nonexclusionary, the private sector will not provide them because it cannot capture sufficient benefits, although the social benefits may be large relative to costs. When goods are nonrival, marginal costs are zero and consumption by one person does not reduce consumption by another person. It is the nonrival aspect of much of infrastructure that makes it a public good.

³Op. cit.

focus on rural infrastructure which provides the basic environment for investments in agriculture. More specifically, they focus on rural roads and rural electrification and, to a lesser extent, on irrigation.

2. The Impact of Investments in Rural Infrastructure

Economists and others have tried to evaluate how rural infrastructure affects agricultural production. As suggested above, the effect is typically indirect, not direct. For example, rural roads make it possible (or less expensive) to distribute fertilizer and other agricultural inputs; fertilizer, in turn, contributes to increased agricultural productivity and incomes. But in trying to explain why agricultural productivity and incomes increased, it is difficult to disentangle the impact of the fertilizer from the impact of the rural road which made the distribution of the fertilizer possible in the first place. (Rural roads also make it possible to move food production from surplus to shortage areas, which is important not only for an efficient economic system but also to promote food security.)

Similarly, rural electrification makes it possible to operate electric pumps for irrigation; irrigation, in turn, contributes to increased agricultural productivity and incomes. But again, in trying to explain why agricultural productivity increased, it is difficult to disentangle the impact of rural electrification from the impact of the irrigation which was made possible by the electrification. (Rural electrification also makes it possible to operate machinery typically needed, for example, by rice mills, to process the increased agricultural production resulting from the use of irrigation.)

It is important to understand these difficulties when reviewing the evidence reported below, which is based on systematic research (including aggregate production studies, village level studies, and farm level studies); project evaluations and appraisal reports conducted by donors; and other books and articles.

Aggregate production studies all indicate that infrastructure variables, when included in the analysis, play an important part in explaining production technology choices and output increases. For example:

- Binswanger et al. (1987) used annual data (1969-78) for 58 countries to carry out both cross-country and within-country time-series analyses. They found: (a) that a 10 percent increase in road density results in a 2.4 percent increase in fertilizer demand; and (b) that a 7 percent increase in agricultural production and fertilizer use during a 10 year period could be attributed solely to roads.
- Another example is provided by Antle (1983) who analyzed 1965 data for 47 less developed countries and 19 developed countries. He found a strong positive relationship between infrastructure (transportation and communication) and aggregate agricultural productivity across both developed and less

developed countries.

Village-level studies add to the body of evidence provided by the aggregate production studies.

- An analysis of 108 Indian villages from 1966-80 by Barnes and Binswanger (1986) showed that rural electrification has a direct and positive effect on well irrigation (but not on total irrigation) and multiple cropping. In addition, the availability of electricity stimulated the growth of rural grain mills, both through the use of electricity in mill operation and through the increased agricultural production made possible by irrigation, which in turn was made possible by electricity.
- Another study of India by Binswanger, Khandker, and Rosenzweig (1989) used data from 85 districts from 1960-61 to 1981-82. Consistent with Binswanger's 1987 study of 58 countries, this study found that: (a) a 10 percent increase in roads (total road length) results in a 2.2 percent increase in fertilizer demand; (b) 7 percent of the growth in aggregate output and 7 percent of the growth in fertilizer use can be directly attributed to road investments; and (c) growth in fixed irrigation investments can be directly attributed to electrification investment, increasing aggregate output by about 2 percent.

Farm-level studies show similar results. For example:

- Using data for the Philippines from 1948-84, Evenson (1986) showed that a 10 percent increase in roads (measured as the number of miles per 1,000 arable hectares) resulted in a 3 percent increase in agricultural production, much of which was generated through the increase in fertilizer use. In contrast, there was a negative relationship between rural electrification and agricultural production which cannot be explained.
- Using 1982 data for Bangladesh (and controlling for the effect of agro-ecological factors), Ahmed and Hossain (1990) found that farms in villages with relatively developed infrastructure: (a) used relatively greater amounts of fertilizer (150 kg per hectare compared to 78 kg per hectare); (b) had more of their land under irrigation (42 percent compared to 21 percent); (c) had more of their land under high yielding varieties (42 percent compared to 25 percent); (d) marketed 36 percent more of their agricultural production; and (e) had 12 percent higher rural wages and wage income.
- In India, irrigation is recognized by policy makers as the most important rural use of electricity. This is consistent with the results of a study cited by Cecelski and Glatt (1982) that 54 percent of the total variance in agricultural production in India as a whole is explained by irrigation.

IFPRI reviewed 45 project appraisals and evaluations of donor agencies in the area of transport, electrification (and irrigation), and integrated rural development (which often includes investments in rural roads and rural electrification). Some projects had been implemented as long ago as the early 1950s and others, in the recent past. Some of the evaluations included estimated rates of return, and therefore, unlike the research studies on production benefits reported above, took costs as well as benefits into account. However, it is not always clear if these rates of return were ex-ante or ex-post.

- A World Bank Mexican roads project reviewed by King (1967) reported an estimated economic rate of return (EER) of 11 to 18 percent, depending on the road section analyzed; it increased to 20 percent if other "unquantified" benefits were added.
- A World Bank roads project in El Salvador was estimated to have a benefit-cost ratio of 3:1 on the basis of increases in shrimp marketing and cotton production that were to occur as a result of the roads.
- A USAID rural roads project in Liberia evaluated by Cobb et al (1980) reported estimated ERRs that ranged from 7.9 to 23 percent, depending on alternative construction and maintenance projections. The evaluation also found that vehicle operating costs were reduced by 90 percent as a result of the roads.
- For Bangladesh, Hossain and Chowdhury (1984) reported the following impacts of roads: (a) user savings and increased traffic, as a result of lower transport costs; (b) complementary investments in irrigation, technology, and other production factors; (c) higher producer prices for outputs and lower input prices; (d) greater use of modern agricultural inputs and correspondingly higher agricultural productivity; (e) greater cultivation intensity; and (f) more frequent contact with extension officials.
- The multi-donor Kenya rural access roads program, which was evaluated by Asfaw (1980), shows high benefits associated with the labor intensive roads (as distinct from those built with conventional capital intensive techniques) with an estimated ERR of more than 30 percent, even though some benefits were not included.

The IFPRI synthesis also looked at relevant books and articles. Among the findings:

- Saith (1986) noted that both Taiwan and Korea share identical growth paths and historical backgrounds, but they achieved a quite different degree of success in generating rural, nonfarm income and employment: in Taiwan, about 80 percent of rural income is received from nonfarm sources compared with less than 48 percent in Korea. This difference can perhaps be attributed

in part to differences in rural electrification and rural roads in the two countries. In Taiwan, 70 percent of farm households had access to electricity even in 1960, compared with only 13 percent in Korea. Moreover, in Taiwan, density of paved roads was 76 km per 1,000 square km in 1962 and 215 km in 1972, whereas in Korea road density was less than 10 km in 1966 and below 50 in 1975.

3. State of Infrastructure

There are few data concerning infrastructure development in the developing countries. Therefore, IFPRI carried out a survey in 7 selected countries in Africa (Benin, Kenya, Malawi, Senegal, Tanzania, Togo, and Zimbabwe) and 5 countries in Asia (Bangladesh, India, Pakistan, Philippines, and South Korea). A comparison of the results across the two continents reveals that infrastructure development is much more advanced in Asia than in Africa, which may help to explain the more rapid agricultural growth that has occurred in Asia compared to Africa.

- The extent of transport and communication infrastructure (road and railway mileage per 1,000 hectares of cultivated land) in the 7 African countries was about one-third that in the 5 Asian countries in 1989.
- Asian roads had almost four times greater vehicle density than African roads in 1989.
- In the African countries for which data were available, only 3-5 percent of the villages were supplied with electricity in 1990; in the Asian countries, excluding Bangladesh, roughly 50 percent of the villages had electricity. But even in Bangladesh, the proportion of villages electrified was double that of Zimbabwe.
- The development expenditure for transport and communication in African countries is about half that in Asian countries, in terms of cultivated land per hectare. However, as a percent of GNP as well as on a per capita basis, public expenditures are similar for the two continents.

Road statistics of the International Road Federation (1988) confirm these differences.

- For African countries for which data are available, road densities range from .01 to .11 km per square km of land area; for Asia, those densities range from .35 to .41 km.
- Similarly, the percentage of roads that are paved is much smaller in Africa (10 percent) than in Asia (35 percent).

D. Agricultural Services¹

1. What are Agricultural Services?

Agricultural services include, for the most part, agricultural credit and agricultural marketing. Marketing, in turn, includes both the marketing of agricultural inputs (such as seeds, fertilizer, pesticides, and equipment) and the marketing and storage of agricultural commodity outputs (such as rice, wheat, and corn).

Agricultural credit is typically needed by farmers to permit them to adopt new technologies. New technologies, in contrast to traditional technologies, normally require farmers to make a cash outlay to purchase inputs such as new seed varieties, chemical fertilizers, and pesticides, or to purchase the means of motorized or animal-powered cultivation. Unless farmers have their own savings available to make these purchases, they need to borrow.

Agricultural marketing services are needed to transport, store, package, and process agricultural inputs all the way from the manufacturer to the farm and to perform these same functions for agricultural outputs, but in this case, from the farm to the final consumer. Unless these marketing services are available, farmers will be unable to adopt the new technologies; even when the services are available, the costs may be too high and farmers will be unwilling to adopt the new technologies. Marketing costs can be reduced by investing in infrastructure to reduce transportation costs or in information services (that provide commodity prices, for example) to improve farmer decision making. Marketing costs vary substantially by commodity and by country. However, they are typically higher in most African countries than in most Asian countries because of higher transport costs due to poorer infrastructure and larger country size (Ahmed and Rustagi, 1987).

Many developing country governments have viewed market failure and "high marketing costs" as justification for intervention in agricultural credit markets as well as input and output markets. Governments nationalized many of the marketing functions, often by creating parastatals that had monopoly control of a particular commodity and by passing laws to control prices and marketing margins.

This began to change in the early 1980s. In the case of agricultural credit, these changes have been manifested by fewer subsidized credit projects, less targeting of loans, more flexible interest rates, and more emphasis on savings mobilization. Also, there has been less emphasis on measuring the impact of credit activities on borrowers and more emphasis on measuring the viability of financial institutions and the performance of financial markets. In the case of input and output markets, many parastatal "businesses" have failed to perform

¹This section is based on a synthesis prepared by Richard L. Meyer and Donald W. Larson, "Issues in Providing Agricultural Services in Developing Countries," December 1993.

efficiently and are now in various stages of bankruptcy, closure, or privatization. The private sector is now seen as having the dominant role in distributing inputs and outputs in the context of competitive markets, with the role of the state to create an enabling environment in which the private sector has a financial incentive to operate.

2. USAID and World Bank Funding of Agricultural Services

Agricultural Credit. The World Bank has been the largest external source of funds for agricultural credit projects. Altogether, 94 countries received Bank funding for agricultural credit from FY 1948 to FY 1992 (World Bank 1993b). The Bank funded 683 credit projects totaling \$16.5 billion (current dollars), which represented about 26 percent of the Bank's total agricultural lending during this period. About 40 percent of the funds were concentrated in just three countries (India, Mexico, and Brazil). Over 80 percent of the funds were allocated to projects in which credit was the chief component, while the remainder went to projects with credit as only one of several components.

USAID has a long history of supporting agricultural credit. Between 1950 and 1973 (when the Spring Review of Small Farmer Credit was published), the Agency channeled more than \$700 million into agricultural credit (Donald, 1976). Between 1973 and 1985, USAID allocated an additional \$300 million to agricultural credit, for a total of slightly over \$1.0 billion (Chew, 1987). The lion's share of credit funds went to the Latin American region.

Agricultural credit also has been important in the lending programs of the regional development banks. During 1970-82 the Inter-American Development Bank (IDB) provided over 60 loans for agricultural credit totalling over \$1.2 billion, and additional projects included credit as a component (IDB, 1984). The IDB pipeline for 1983-86 included 13 loans for agricultural credit totalling \$640 million, plus additional loans that had credit components. The Asian Development Bank (ADB) began its agricultural credit operations in 1970 and by 1991 had approved 72 projects for a total of almost \$1.4 billion. Just over \$1.0 billion was provided by 36 projects where credit was the sole component, and the remainder was provided by projects where credit was one of several components (ADB, 1993).

Thus, the donors have funded a combination of "credit-only" projects and "credit component" projects. The credit component type was particularly important in the mid-1950s when projects were designed to stimulate farm production through adoption of a package of agricultural inputs, and credit was perceived as part of the package. With the advent of the Green Revolution in the mid-1960s, many projects specified a package of inputs, and farmers were able to obtain credit only if they used that recommended package. Later, when the new inputs were readily available and lending institutions were in place, credit-only projects were designed to stimulate lending to specific clientele groups, such as small farmers. In both types of projects, the rationale for donor and government involvement in agricultural credit was often based on the assumption that access to credit was a critical constraint to the adoption of modern technologies, which required poor, small farmers with meagre savings to purchase inputs such as fertilizer and improved seeds. This

perception of unmet credit needs led policymakers and donors to increase the supply of loans which was considered necessary to "lead" the process of agricultural development (Lieberson, et al, 1985).

Agricultural Marketing. From 1980 to 1986, the major bilateral and multilateral donors invested \$12.5 billion in agricultural development, of which eight percent was allocated to agricultural marketing services (Meissner, 1989).

Of 203 agricultural services projects funded by USAID between 1958 and 1982, 24 (or about 12 percent) were "marketing-only" projects; many others, though, had a "marketing component" (Solem et al, 1985). Of the 203 projects, 72 were implemented in Africa; 40, in Asia; 70, in Latin America; and 21 in the Near East. USAID marketing assistance has been oriented mainly toward the public sector (52 percent); the remainder has been provided solely to the private sector (22 percent) or to both the public and private sectors (26 percent).

World Bank assistance in agricultural marketing is even more limited. A review of 402 agriculture projects implemented from 1974 to 1985 discovered only 12 projects (or three percent) with a "marketing-only" focus; however, 49 percent of the agriculture projects included marketing components (World Bank 1990a). Of 185 agricultural projects that included marketing assistance, 110 were implemented in Africa; 35 in Asia; 10 in Europe, the Middle East, and North Africa; and 30 in Latin America and the Caribbean. Most World Bank marketing assistance has been provided to parastatals, with small amounts to private sector firms and cooperatives (World Bank 1990a).

3. The Impact of Investments in Agricultural Services

Agricultural Credit. Serious doubts about the impact of agricultural credit projects began to emerge as early as 1973 with the Spring Review (Donald, 1976), and many evaluations and academic studies since then have documented their shortcomings. These evaluations, however, have faced serious methodological problems. First, because credit is fungible, it is difficult to measure its impact. Second, credit projects can have an impact (positive or negative) on (a) the borrowers (the farmers), (b) the lenders (cooperatives, commercial banks, development banks), and (c) the national economy. However, the evaluations usually ignored the impact of credit projects on the lenders (the financial institutions), which often would result in the paradox of successful credit projects but failing financial markets (Adams, 1988).

Farm Level Impact. The fungibility of credit makes it extremely difficult to determine farm level impact. Some borrowers, for example, divert farm credit to finance more lucrative, non-farm activities, especially when the loan is subsidized. Others use loan funds to substitute for their own savings that, in the absence of credit, they would have used to purchase agricultural inputs. Thus, it is difficult to attribute changes in agricultural output or farm income to agricultural credit: it may increase in the absence of credit; it may decrease even with credit. The following examples illustrate the point.

- The World Bank reviewed the farm level impact of 41 credit projects completed in the last five years. The review was generally favorable and found, for example, that the rapid expansion of farm mechanization in central and southern Brazil in the 1970s and 1980s was associated with World Bank credit. However, the review also notes that in the period 1978-85, the rapid expansion of rural lending was not matched by a commensurate increase in farm production, mainly because the funds, which were not indexed for inflation, were diverted to non-farm uses. When the interest rate was raised to reflect inflation more fully, the credit program again served farmers who invested in farm enterprises (World Bank, 1993a).
- The large Masagana 99 program in the Philippines, supported by USAID beginning in 1973, involved a package of inputs and supervised (and subsidized) credit provided without collateral. The lending program reached as many as 530,000 farmers at one time, roughly one-third of all rice farmers in the country; however, the number fell to 70,000 by the early 1980s due to accumulated defaults.
- India has received substantial donor assistance for agricultural credit. About 30 percent of rural families have obtained access to institutional credit under a system that includes targets, quotas, interest rate controls, and huge subsidies (Reserve Bank of India, 1989). A 1989 study found that the rapid expansion of banks had a large impact on fertilizer demand and on investments in tractors, pumps, and animals; however, the interest rate subsidy had little impact on fertilizer demand or aggregate crop output (Binswanger, Khandker, and Rosenzweig, 1989).
- If an expansion of credit has a large impact on production, one might expect production to fall after credit supplies or interest subsidies are reduced or eliminated. But it has been difficult to identify any short-term production declines due to credit shrinkage, suggesting that farmers have been able to find ways other than through subsidized formal credit to finance their operations when credit programs were terminated (Vogel and Larson for Colombia, 1984; Araujo, Shirota, and Meyer for Brazil, 1990).
- The use of subsidized credit has sometimes led to a misallocation of resources. For example, a subsidized credit project in Yugoslavia encouraged overinvestment in agroindustry, resulting in substantial excess capacity. Subsidized loans in Morocco and Tunisia may have led small farmers to acquire oversized tractors. On the other hand, a moderately subsidized credit project in Pakistan did not accelerate the use of tractors beyond their economic return, nor did it encourage the excessive displacement of agricultural labor (World Bank, 1993).
- Subsidized credit projects have tended to worsen, rather than improve, income distribution. For example, in Costa Rica, 80 percent of all agricultural loans made in 1974 went to large farmers who were the wealthiest persons in the country, so they received most of the interest subsidy (Vogel, 1984). The same situation occurred in

Brazil from 1970 to 1985, where most of the interest subsidy went to the wealthiest farmers, thereby worsening the country's already highly unequal income distribution (Araujo, Shiota, and Meyer, 1990).

Impact on Financial Institutions. If the impact of credit projects on farmers is ambiguous, their impact on lending institutions is quite clear. Many development finance institutions, including specialized agricultural development banks, have failed in developing countries; others have had to be recapitalized because of losses; and most rely on continuous subsidies (McKean, 1990). Of the financial institutions supported by World Bank agriculture projects, only 44 percent were financially sound by the end of the project (World Bank, 1993).

There are four major reasons for the poor performance of agricultural financial institutions: (a) poor rates of loan recovery; (b) high operating costs; (c) neglect of deposit mobilization; and (d) hostile economic environment.

The first factor, poor loan recovery, can be devastating for financial institutions.¹ Agricultural borrowers are more likely than non-agricultural borrowers to experience unanticipated natural calamities that make it impossible for them to repay as planned. In addition, the incentive structures built into government and donor funded programs (as distinct from commercial operations) tend to have a negative impact on loan recovery. Thus, lenders tend to be rewarded for making, not recovering, loans, and this leads to lax recordkeeping and weak collection efforts. Similarly, subsidized interest rates lead to loan rationing which provides an environment conducive to political intrusion about who gets cheap loans and who must repay. Finally, targeted loans carry restrictions about screening criteria for borrowers which may cause lenders to loan to customers who do not meet their normal lending criteria.

- Out of 35 completed World Bank projects, only 14 reported collection rates of 90 percent or more; seven had rates of between 70 and 90 percent; five had rates of between 50 and 70 percent; and nine had rates below 50 percent. Moreover, 13 reported declining collection trends; 19 reported level trends; and only three reported improving trends (World Bank, 1993).

In addition to poor recovery, high operating costs hamper the financial viability of lending

¹Assume that a credit project prices its loans five percentage points below inflation; that operating costs are five percent; and that the institution recovers 95 percent of the principal and interest that is due on its loans (that is, sustains only a five percent default rate). If all funds are loaned out at the beginning of the year, by the end of the year the credit fund will shrink to 85 percent of its original value; and by the end of five years, it will shrink to only one-half its original purchasing power.

institutions.

- In Honduras, for example, lending costs for a government-owned bank using donor funds were nearly five times the lending costs of a privately-owned bank using its own funds (Cuevas and Graham, 1984).
- The Agricultural Bank of Sudan was limited to charging 7-9 percent on loans when its administrative costs averaged 10-15 percent (Ahmed and Adams, 1987).

The third factor that explains the poor performance of financial institutions is that deposit mobilization has been neglected. Borrowers are more likely to repay and lenders are more likely to exert more effort at recovery when the funds come from local savers rather than distant governments or donors. USAID has supported savings mobilization projects involving credit unions and development banks. These efforts have had a positive impact on loan recovery in the Dominican Republic, Honduras, Peru, and Bangladesh (A.I.D., 1991).

Finally, some financial institutions have failed because of a hostile economic environment (Chew, 1987; Lieberman, 1985; Meyer, Graham, and Cuevas, 1992). In some cases, the macroeconomic policy environment has been a disincentive to agricultural growth (Krueger, Schiff, and Valdes, 1988). In other cases, the new technologies on which credit projects were predicated were neither as available nor as profitable as assumed. In short, agricultural credit is not a good bet in the absence of an economic policy framework conducive to agriculture and an agricultural technology that is profitable.

Impact on the National Economy. Agricultural credit projects have been an easy mechanism by which to disburse foreign exchange to developing countries. As such, it might be argued that the positive effect of the foreign exchange on the national economy outweighs the poor performance of the credit projects at the farm level and their negative effects on financial institutions. On the other hand, the fact that most donors have abandoned credit projects suggests that this is not the case, and that the costs of these projects exceed their benefits.

Thus, the results of many agricultural credit projects -- at all three levels of potential impact -- have been disappointing. However, there are a number of successful cases.

- Von Pischke and Rouse (1983) identified five countries in which financial services were being provided to smallholders in Africa fairly successfully: Caisse National de Credit Agricole in Morocco, the Cooperative Savings Scheme in Kenya, credit unions in Cameroon, savings clubs in Zimbabwe, and group credit in Malawi.
- The Grameen Bank in Bangladesh has made thousands of small loans to poor people, mostly women, under a system of group lending (Hossain, 1988).
- The Indonesia experience is equally successful, except that loans are made to

individuals rather than to groups (Chavas and Gonzales-Vega, 1993).

The factors contributing the more successful results in these countries include generally favorable economic conditions; flexible interest rates so savers can be rewarded and financial institutions can cover their costs; and an emphasis on simple, traditional rural institutions that operate on a scale consistent with the routine transactions of rural people. In contrast, the failures are dominated by top-down projects designed to provide subsidized credit to targeted borrowers who are assumed to be too poor to save so savings mobilization is ignored; in addition, little concern is paid to the negative impact of the projects on the financial institutions.

Recent studies show that macroeconomic, financial, and agricultural policies must be reformed before interventions in rural financial markets are likely to be successful (Besley, 1992; Stiglitz, 1992).

Agricultural Marketing. Until recently, donors have worked primarily with public sector organizations to strengthen agricultural marketing services in developing countries. However, the performance of these organizations has been very disappointing to the users, the government, and the donors (World Bank, 1990a and 1991). They have been plagued with high costs, poor management, misuse of funds, poor service, and large operating deficits.

Grain storage projects in India, Bangladesh, Brazil and elsewhere were justified in the early 1970s on the grounds that they would significantly reduce post harvest losses (estimated at 17 to 21 percent). Bulk storage of grain in large facilities was thought to be the most economical way to reduce post harvest losses. In contrast, recent research has found that losses in traditional storage are much lower than previously thought (1.5 to 4.5 percent) and that bagged storage is more economical than storage in large facilities (World Bank, 1990a, p. 4). The economic rates of return to major grain storage projects supported by the World Bank from 1974 to 1987 have been recalculated using more realistic postharvest loss data. In the case of India, rather than 25 percent as estimated during project design, the economic rate of return is 8.5 percent, assuming a postharvest loss estimate of 5 percent, the highest that could be justified (World Bank, 1990a, p. 41). Given the low recalculated economic rates of return, it is unlikely the Bank would have considered these grain storage projects bankable.

Large donor investments in wholesale markets and rural markets were also justified on the basis of reducing both food losses and marketing margins. These projects typically financed the construction of facilities that were owned and operated by the public sector. As with the grain storage facilities, the economic rates of return were probably overestimated, because actual food losses were much less than originally estimated, and, as with grain storage facilities, they would probably not be considered bankable (World Bank, 1990a).

The impact of investments designed to improve the efficiency of agricultural markets is

intimately linked to agricultural price policy. Farmers will produce a marketable surplus if it is profitable to do so. Price level and price stability are key factors that help to determine whether or not markets will be profitable. As suggested above in Section A., undervalued foreign exchange rates, price ceilings, pan-territorial pricing, marketing margin controls, parastatal marketing monopolies, and other policies have been used by governments to reduce food costs in urban areas. But at the same time, they have reduced producer price levels, the effect of which has been to reduce the farmer's incentive to produce a surplus that can be sold profitably on the market.

Price instability (as distinct from price level), which is often caused by rainfall variability and other uncontrollable factors, can also reduce the farmer's incentive to produce a marketable surplus. Government parastatals have attempted to stabilize prices by purchasing food grains at floor prices and then storing the grain until the price rises. However, the cost of these government operations has usually been very high, and most analysts believe that their price stabilization objectives can be achieved more cost effectively through private sector trade than they can by government operations to purchase and store grain (Abbott, 1985; Neils, Reed, and Lea, 1992). In fact, reducing government intervention in markets is viewed as necessary to improve market performance (Krueger, 1978; World Bank, 1991).

Given this record of failure, many governments have attempted to deregulate markets, promote competition, and privatize government parastatals. The key to market liberalization is to introduce policy and regulatory reforms that effectively dismantle government control of agricultural prices (at different levels in the marketing chain) and reduce direct government participation in agricultural input and product markets. Recent USAID experience in supporting agricultural market liberalization in seven countries in Africa (Mali, The Gambia, Zambia, Togo, Uganda, Mozambique, and Niger) has been rather positive (Wolgin, 1990). The biggest impact of market liberalization is the reduction in marketing costs, which has resulted in increased incomes for producers and reduced prices for consumers.

Agricultural marketing has been most successful when the private sector has played a dominant, if not exclusive, role in commercial production, processing, and trading activities. The government, on the other hand, has a legitimate role to provide facilities and services which are public goods, give rise to externalities, or exhibit large economies of scale (Jaffee, 1993, pp. 57-60). USAID and other donors, for example, have assisted in the development of "marketing software" that provides price information for basic foods at the retail, wholesale, and farm levels on a regular basis. Such systems have been initiated and continue to operate in Brazil, Chad, Colombia, Costa Rica, Ecuador, Indonesia, Kenya, Korea, Mali, Philippines, Taiwan, Tunisia, and Thailand.

As indicated at the outset, agricultural services includes not only the marketing of agricultural commodities, but also the marketing of agricultural inputs. A World Bank survey of 39 countries found a very strong tendency for the government to control input marketing services in the 1980s. The frequency of government control of the procurement and distribution of key agricultural inputs is shown in Table 12.

Table 12. Percentage of Input Marketing Services Controlled by the Public Sector, Private Sector, and Mixed (Public and Private Sectors)

Input Marketing Service	Public Sector Alone	Mixed (Public and Private Sectors)	Private Sector Alone
Fertilizer	64	25	11
Seeds	61	28	11
Chemicals	47	36	17
Farm Equipment	42	36	22

Source: World Bank, in Abbott, 1993.

USAID has supported a number of market liberalization programs designed to reduce fertilizer subsidies, reduce fertilizer price controls, eliminate marketing margin controls, reduce government distribution of fertilizer, and increase private sector marketing of fertilizer and other inputs. In four countries in Africa (Malawi, Kenya, Cameroon, and Guinea) it was found that private marketing was much more efficient than public sector marketing, and that the efficiency gains from privatization can amount to 25 percent of the cost of the inputs (Wolgin, 1990, p. 37). Conversely, the key constraints associated with poor delivery of fertilizers in Africa were found to be the lack of foreign exchange to import fertilizer, insufficient resources for parastatals to finance fertilizer distribution, import licensing systems, lack of working capital (for importers, wholesalers, transporters, and retailers), price controls, fixed marketing margins, and poor transport facilities (Lele, Christiansen, and Kadiresan, 1989, p. 47).

Bangladesh is another case where the distribution of fertilizer and other agricultural inputs has been successfully liberalized. As a result, farmer access to fertilizer "points of sale" has greatly increased; fertilizer prices under the new marketing system are lower than under the old marketing system; and the private sector market share in total fertilizer sales increased to over 84 percent in 1990-91 from 61 percent in 1989-90 and from nearly zero when the program began in 1978 with USAID assistance (World Bank in Abbott, 1993, p. 303; IFDC, 1990 and 1991).

Thus, market liberalization and privatization can succeed. The private sector, which appears to have a comparative advantage in providing the vast majority of agricultural services, can carry out input and output marketing better and at lower cost than government parastatals (Wolgin, 1990; World Bank, 1990a). In contrast, governments need to invest in infrastructure (such as roads and bridges, as distinct from trucks and gasoline) and market

software (such as price information) in order to improve the performance of the market system and make private markets work better.

Based on all the marketing projects reviewed, perhaps "the clearest lessons relate to actions that should be avoided rather than to those that should be replicated" (World Bank, 1990a, p. 25).

E. Asset Distribution and Access¹

1. What is Asset Distribution and Access?

This element of agricultural development concerns agrarian structure -- the institutional framework determining the distribution of and access to resources. Land is the most fundamental resource for agriculture. Investments in this area are designed to increase agricultural productivity and at the same time promote equity.

In characterizing the various types of agrarian structure, the literature distinguishes among several important concepts. **Land tenure** consists of the legal rights and institutions that determine how land is owned and operated. **Land reform** is a basic restructuring of the land tenure system (Thiesenhusen, 1989). Some analysts distinguish between land reform, which is the redistribution of land and property rights, and **agrarian reform**, which includes not only land reform but also the provision of ancillary rural infrastructure and agricultural services that usually must accompany land reform to assure its success; that is, the third and fourth elements of agricultural development discussed above. **Tenure security** is the assurance of continuing access to land or related resources. Land reform is one way to improve tenure security. Other ways to improve tenure security include **titling programs** (the issuance of legal documentation to holders of plots of land) and **land registration programs** (recording of those titles by the state) (Stanfield, 1990). Other ways to enhance access to land or otherwise modify the existing distribution of land include programs to improve the functioning of **land markets**, **land taxation systems**, and **land settlement programs**.

Land reform, which breaks up large farms and redistributes the land as smaller farms, makes sense as an intervention to spur agricultural growth because small farms in underdeveloped countries tend to be more productive than large farms. Empirical evidence supporting this inverse relationship between farm size and agricultural productivity has been examined most extensively by Berry and Cline (1979). Table 13 shows this relationship for 39 countries grouped by region. Countries where the average farm size is smaller and where the

¹This section is based on a synthesis prepared by Virginia Lambert and Mitchell A. Seligson, "Asset Distribution and Access: Land Tenure Programs," February 1994.

distribution of land is more equal generally have higher farm output (GDP) and higher employment per hectare of available land. That is, as farm size increases, farm GDP per hectare and employment per hectare decrease. This is because the large farm sector uses its land less intensively than the small farm sector, as measured by the percent of farm area under cultivation. In addition, the small farm sector applies labor more intensively per hectare than does the large farm sector. This inverse relationship between farm size and productivity has generated extensive empirical research, both to refine the measures of agricultural production and agrarian structure and to verify the causal mechanisms. (Sen, 1981; Carter, 1984; Carter and Jonakin, 1987; Thiesenhusen and Malmed-Sanjak, 1990; Binswanger et al, 1993). The inverse relationship has been confirmed uniformly across a variety of agricultural systems and geographical locations. It even holds when the influence of land quality is removed (Berry and Cline, 1979, pp. 126, 134); and it holds when total social factor productivity (as distinct from land productivity) is used as the measure of performance, at least above the very smallest size farms (Berry and Cline, 1979, p. 134).

There is sometimes a tendency (or a desire) to try to reproduce in the developing countries the economies of scale that characterizes U.S. (and Western) agriculture. However, this ignores the differences in the relative abundance of factor inputs which allows capital intensive technologies to be profitable in the U.S., but not in the developing countries where capital is relatively scarce. In the U.S., good agricultural land is relatively abundant and labor is not; economies of scale can be achieved through the application of labor saving mechanical technologies to large land areas. In contrast, in most developing countries labor is relatively abundant but good agricultural land and capital are not. Thus, profitable production technologies tend to use large amounts of labor (relative to capital) on small farms. Since biological technology (as distinct from mechanical technology, like tractors) is highly divisible, small farms can achieve high per hectare yields and profitability through the application of improved biological technology.

In addition to the inverse relationship between farm size and productivity, there is a second important relationship underlying interventions in land distribution and access. This is the presumed positive relationship between tenure security and agricultural productivity. The degree of tenure security varies along a continuum, from holding land as a squatter (little security) to holding fully titled and registered private property (maximum security). In principle, a farmer with more secure tenure will work the land more intensively and make long term capital improvements because he knows he will be the beneficiary of the investments. In addition, fully registered titles allow the land to be used as collateral for credit, which contributes to increased investment, and thus increased productivity. (As indicated below, however, the empirical evidence concerning the relationship between titled land and access to credit is mixed.)

Market mechanisms, as distinct from redistributive land reform, can also improve the distribution of land and increase productivity. The main problem with this alternative is that land markets are imperfect, especially in developing countries. In Latin America, for example, small and large properties are transferred in separate markets, thereby thwarting the

Table 13. Productivity, Employment, and Average Farm Size in Selected Countries

Country	Size of Average Holding (hectares)	Farm GDP per Hectare (US \$)	Employment per Hectare
Europe			
Greece	3.18	424	0.50
Spain	14.85	90	0.09
Central America			
El Salvador	6.95	186	0.38
Guatemala	8.17	144	0.29
Dominican Republic	8.64	129	0.28
Nicaragua	37.34	55	0.09
Costa Rica	40.70	83	0.09
Mexico	123.9	22	0.04
South America			
Peru	20.37	50	0.10
Colombia	22.6	67	0.10
Brazil	79.25	14	0.05
Venezuela	81.24	31	0.03
Paraguay	108.70	11	0.02
Chile	118.5	18	0.03
Uruguay	208.8	14	0.01
Argentina	270.1	18	0.01
Asia			
Korea	0.85	1,085	2.88
Indonesia	1.05	323	2.17
Japan	1.18	1,720	1.45
Nepal	1.23	352	2.54
China	1.27	841	2.05

Vietnam	1.33	355	2.79
Sri Lanka	1.61	376	1.12
Pakistan	2.35	240	0.96
Thailand	3.47	166	1.21
Philippines	3.59	250	1.25
Turkey	5.03	155	0.64
Iran	6.05	187	0.32
India	6.52	172	1.22
Africa			
Malagasy	1.04	293	3.32
Egypt	1.59	681	1.89
Togo	2.62	189	1.05
Uganda	3.29	167	0.84
Senegal	3.62	209	1.20
Kenya	4.20	183	1.31
Mali	4.35	98	2.06
Morocco	4.62	144	0.49
Botswana	4.75	168	1.18
Tunisia	15.41	42	0.12

Source: World Bank, Land Reform: Sector Policy Paper, 1975, p. 26.

achievement of a major theoretical objective of land markets, which is to eliminate farms that are too large and too small. In addition, land markets are often distorted and tend to operate to the benefit of large farmers. For example, when transaction costs are fixed, the cost per unit of land is greater for smaller farms than for larger farms.

Where land markets do operate efficiently, land taxation can be introduced in order to influence land distribution and, in turn, agricultural production. At a minimum, a standard tax on all land, productive or not, should encourage owners of large, unproductive farms to

sell or to become more productive. However, as a practical matter, most taxation systems are normally manipulated by the rich and powerful for their own benefit.

Finally, land settlement is an option, not for modifying the distribution of land currently in production, but rather for bringing new lands into production. Of course, opening new land to farming is only an option in countries that have significant tracts of uncultivated land. In addition, investments in infrastructure typically associated with the settlement of new lands are generally expensive.

2. Historical Context

From the end of World War II through the early 1960s, the U.S. actively promoted redistributive land reform in other countries, playing a particularly key role in directing and financing reforms in Japan, Taiwan, and Korea. The importance the U.S. attached to land reform is seen in the 1961 Charter of Punta del Este for the Alliance for Progress, which proposed land and tax reform as preconditions for U.S. financial aid to Latin American countries. The pre-1960 reforms, including those directed by the U.S. in Asia, generally are viewed as the most successful. In addition to the role played by conquering forces, success is attributed to the fact that reform did not involve the redistribution of land, but rather a change in tenure status: small farmers continued to farm the same land, but as owners rather than as tenants. In Latin America, the major pre-1960 reforms were in Mexico (1930s), Bolivia (1952), and Cuba (1959). These were generally driven by populist forces and revolutions.

In the 1970s, U.S. support for land redistribution was seen as a tool to forestall the rise of communist peasant organizations. Thus, cold war concerns led to U.S. support of the land reforms in Vietnam and El Salvador, but at the same time, to their opposition when the reforms were being made by leftist regimes such as Allende's Chile or Sandinista Nicaragua. During the period 1978-1983, \$2.8 billion was budgeted for redistributive programs (Montgomery, 1984).

In the 1980s, opponents of reform were bolstered by the relative lack of results of on-going reforms in Latin America and elsewhere, and their high cost. Evaluations showed that successful land redistribution required costly additional investments in a range of ancillary services and rural infrastructure to support reform beneficiaries. At the same time, the focus of U.S. foreign assistance was shifting toward macroeconomic policy reform and private enterprise development. This shift was reflected in both USAID and World Bank policy. In 1970 the Spring Review of Land Reform (A.I.D., 1970) concluded that land redistribution should be supported because of its social and political impacts on the distribution of opportunity, power, and employment. This was reinforced by the Agency's 1979 Policy Determination (PD) on "Land Reform." In 1986, however, the Agency's new PD on "Land Tenure" does not mention land reform or redistribution. Similarly, the World Bank's 1976 Sector Policy Paper on Land Reform states: "In circumstances where increased productivity can effectively be achieved only subsequent to land reform, the Bank will not support

projects which do not include land reform" (World Bank, 1975, p. 14). More recent Bank discussion papers question the financial and political feasibility of carrying out reform and conclude that in most circumstances other policy options may have more impact than land redistribution (Binswanger et al, 1993).

In the 1990s, land tenure continues to be important, but the issues reflect different dimensions. Concern with natural resource utilization and conservation has sparked a conflict between small farmers and landless people who need land to farm and those who champion the need for protected environmental zones. Also, the disintegration of the former Soviet Union has moved land tenure issues of decollectivization and privatization to the forefront of the policy agenda in Eastern and Central Europe and in the New Independent States (NIS).

3. The Impact of Investments in Asset Distribution and Access

The Spring Review of Land Reform (A.I.D., 1970) provided strong evidence confirming the hypothesis that pre-reform levels of production and productivity generally increased or at least were maintained when farm size was reduced as a result of reform. This conclusion was based on 30 country case studies. For example:

- In Yugoslavia in the 1920s, North Vietnam in the 1950s, and Iran in the 1960s, there was a sudden burst in output right after the reforms because sharecropper arrangements were changed.

But this was not always the case. For example:

- There were initial drops in output right after the reforms in Bolivia (because contested lands were not cultivated), in Cuba (because of the early drive for diversification), and in Algeria (where a socialized, but still highly productive, sector was reformed).

Doreen Warriner (1973, p. 120) compared changes in average wheat yields in six countries. Three of the countries (Japan, Egypt, and Italy) implemented agrarian reforms or integral land reforms (which is land reform implemented together with rural infrastructure and agricultural services). The other three countries (Bolivia, Iran, and Iraq) implemented simple land reforms (land reform without the infrastructure and the services). Warriner concluded that integral land reform was more successful than simple land reform, based on a comparison of average wheat yields in the six countries. The integral land reforms implemented in Taiwan and Korea (as well as Japan), which are generally touted as successful, illustrate this point.¹

¹However, the successful land reforms implemented in East Asia after World War II also created institutional barriers that, almost 50 years later, tend to discourage land leasing, transfer, or consolidation. As a result, many farms are only a fraction of their most efficient size in

The World Bank assessed the impact of land reforms that occurred in five Latin American countries: Bolivia (1952-1955); Chile (1967-1973); Mexico (1934-1940); Peru (1969-1976); and Venezuela (1965-1970) (Eckstein et al, 1978).

- The evaluators found unequivocal positive impacts on production within the reform sector in four of the five cases, all except Peru. While it was impossible to separate out the direct impact of land reform on production, certainly it did not prevent the observed accelerated growth rates in four of the five countries, even if it did not necessarily bring them about (p. 112).
- The inverse relationship between farm size and productivity was observed in all five countries, particularly in Mexico and Bolivia; this was attributed to greater labor intensity on small farms and changes toward higher value farm products.
- In all five countries low income beneficiaries gained and high income landlords lost; these effects on rural income distribution were greatest in Mexico and Bolivia, while the impact was minimal in Chile and Peru.

During the last decade several retrospective comparative studies of the effects of land reform have been published. In contrast to the earlier evaluation literature cited above, these studies suggest that the positive economic impacts that were expected have not been realized. No quantitative data on the economic impact of land reform are provided by these studies, but they do offer credible reasons for the poor performance.

- Thiesenhusen examined land reform in 10 countries and suggests that the multiple goals of the reforms (social, political, and economic) were not compatible. In addition, he points out that many beneficiaries of land reform had inadequate access to agricultural services and inputs needed to farm effectively (Thiesenhusen, 1989).
- Dorner attributes the failures of land reform to the lack of strong commitment and insufficient political will. And, like Thiesenhusen, he notes that agricultural services (inputs, credit, markets) were not available via the private sector and were not provided by the government (Dorner, 1992).
- Powelson and Stock looked at land reform in 27 countries, and they identify the government as responsible for the disappointing results. They conclude that the state used land reform as a tool to skim off agricultural surplus rather than allow the peasants to realize the benefits of land ownership (Powelson and Stock, 1987).
- In contrast, de Janvry believes that land reform did have an impact on agricultural production, but that the increased production was due to reform-induced changes on

today's global economy (Tweeten, 1994).

the lands excluded from the reform (Unaffected farmers feared they would be adversely affected in the future.), and therefore occurred on those farms rather than on farms created by the reform (de Janvry, 1981).

Evidence concerning the impact of land titling and registration programs is mixed.

- In Thailand, a comparison of titled and untitled landholders showed that there was increased access to and use of credit, and increased investment, among titled landholders (Feder et al, 1988).
- In contrast, a comparative evaluation of USAID-sponsored land titling programs in Honduras, St. Lucia, and Ecuador showed no systematic differences in the use of credit between titled groups and control groups. The study also showed, however, that small farmers perceived an increase in the value of titled land compared to untitled land as a result of the titling programs (Stanfield 1990).
- In Kenya, Uganda, and Zimbabwe, titling in and of itself had little effect on investment demand or credit use because of constraints on the supply of credit (Barrows and Roth, 1989).

Land financing programs designed to influence land markets have been supported in Latin America. These have included the Penny Foundation land purchase/sale program in Guatemala, a mortgage guarantee fund in Honduras, and a land bank program in St. Lucia. Although there are no evaluations concerning the impact of these programs on agricultural production, such impact has probably been negligible: the Guatemala program has run into organization problems; the Honduras program which was intended to make land loans was used very little before it expired; and the St. Lucia program was never fully implemented. A central issue for both governments and private organizations in the implementation of land financing programs of this nature is whether or not there is the political capacity to foreclose on small, otherwise landless, farmers.

Land taxation is generally not an effective way to achieve non-revenue goals like intensifying land use or encouraging land sales (Strasma, 1987). Developing countries typically lack the institutional infrastructure needed to assess, collect, and process the taxes. In addition, land taxes are usually very low (often times because of political pressures), and therefore, they are not effective incentives either for current owners to use their land more intensively or to sell their land to those who might use it more intensively. And because land taxes are so low, the expense of collection is generally not justified. Finally, tax collection is frequently plagued with corruption. In short, land taxation schemes face the same political hurdles as redistributive land reforms (Binswanger et al, 1993).

Land settlement projects have also received donor support. A World Bank review of 27 settlement projects reported that 62 percent of those that had been audited had economic rates of return of 10 percent or better. But the costs per family were high. They usually

exceeded \$10,000 per family for irrigated settlement projects and ranged from \$5,000 to \$20,000 per family for rainfed agriculture (World Bank, 1985).

3. FINDINGS

Part 2. synthesized the evaluation literature in each of the five major areas of agriculture.
Part 3. summarizes the findings of the desk study in terms of the six key questions identified at the outset.

- A. *Sequencing Investments in Agriculture. Which agricultural investments are most appropriate for various levels of institutional and policy development; is there a logical sequence for investing in the five agricultural sub-sectors?*

The evaluation literature seems clear: there is a preferred sequencing of investments in agriculture. The first priority is to develop an environment in which agriculture will function. Such an environment includes at least three key components: policies, technology, and infrastructure.

The overriding priority is policies that directly or indirectly affect agriculture. Price policies, exchange rate policies, trade policies, monetary policies, and fiscal policies must provide farmers with an opportunity to make an economic return. If a threshold level of proper policies is not in place, it is not worthwhile for donors to contribute to any other investments; nor is it worthwhile for farmers to take risks and use new technologies needed to increase production beyond subsistence levels.

Technology and infrastructure work synergistically if the proper policy environment is in place. There is no particular sequencing for investing in one or the other; rather, they interact to promote each other. In order to promote agricultural growth, high yielding agricultural technology must be available. Traditional technology offers little scope for a dramatic reallocation of resources, an increase in resource use, or productivity gains. Farmers are unlikely to increase their use of production inputs unless they can obtain a high response.

At the same time, agriculture cannot perform well unless some rudimentary infrastructure is in place. The IFPRI synthesis suggests that "The degree of infrastructural development is in reality the critical factor determining the success of market-oriented sectoral and macroeconomic policies in the developing world" (Ahmed and Donovan, 1992, p. 31). There is little value in supplying credit or modern inputs to farmers if they lack the roads, bridges, and transportation to acquire the inputs and to transport their harvests to market. Subsidized credit or inputs cannot compensate for nonexistent roads or bridges.

Many projects designed to provide agricultural services (typically agricultural credit or marketing services) have failed. The primary reason for these failures is that the services

were provided in countries that were pursuing policies heavily biased against agriculture. The early supervised credit projects ran into difficulty because there was a poor supply of good technology available for farmers to adopt (Donald 1976). Strong support institutions supplying agricultural services rarely exist where agriculture is weak.

Finally, the evaluation literature suggests that there is no particular stage of development when investments to improve the distribution of assets or to improve access to land should occur. The literature does, though, make two generalizations that are germane to the issue. First, if investments to improve land distribution take place, they will take place to achieve a political objective, not an economic efficiency objective. Second, in spite of the fact that political stability and equity (rather than economic considerations) drive the decision to improve the distribution of assets, there will still be an economic impact, positive or negative, intended or unintended, resulting from such investments. And this economic impact is likely to be more positive if a package of ancillary services to support the investment is already in place -- services such as basic infrastructure, for example. Thus, investments to improve asset distribution should support agricultural development, not initiate the process.

Discussion

Policy Reform and Planning. Getting the macroeconomic policy environment right is an important first step for getting the agricultural policy environment right, which in turn, is an important first step for successful agricultural investments. Without policy reform, both macroeconomic and sectoral, many other investments fail.

Knudsen and Nash examined whether or not sectoral adjustment lending can proceed before macroeconomic stabilization has been achieved and found that progress on agricultural reform in an unstable macroeconomic situation is rare. In fact, they found that projects implemented in a distorted, anti-agriculture policy environment actually discouraged agricultural growth, and that the provision of foreign exchange actually perpetuated overvaluation and indirectly sanctioned the continuation of the anti-agricultural policies (Knudsen and Nash, 1991, pp. 131, 148).

Similarly, Cleaver observed that in the late 1970s and early 1980s, 63 percent of the World Bank's agricultural projects were judged successful in countries with relatively "good" economic and agricultural policies (World Bank, 1993a). In contrast, only 30 percent of the World Bank's agricultural projects were judged successful in African countries having relatively "bad" economic and agricultural policy" (Cleaver, 1993). Although getting the policy environment right is important for all sectors, it is especially important for agriculture given the history of economic distortions in the agriculture sector in most developing countries.

Agricultural Technology Development and Diffusion. Although high yielding technology must be available to farmers, the evaluation literature is unclear on whether or not

investment in agricultural research is required at all stages of development. For example, some suggest that countries should first apply existing technology that is on the shelf, before developing new technology. Others suggest that very poor countries should borrow technology from neighboring countries, rather than develop their own technology. There is agreement, however, that agricultural research designed to maintain existing yields (as distinct from achieving higher yields) is needed at all stages of development. There is also a consensus that complementary investments designed, for example, to establish market-oriented macroeconomic and sectoral policies and develop infrastructure can enhance the impact of investments in research.

Rural Infrastructure. To the extent purchased inputs (such as fertilizer) are needed to boost agricultural productivity, and to the extent roads are needed to distribute those inputs, the absence of roads will constitute a binding constraint to increased agricultural growth. Similarly, to the extent increased agricultural output requires processing, and rural electrification is needed to operate higher volume agribusinesses (such as flour mills and rice mills), the absence of electrification will constrain agricultural growth. Rural electrification is also needed for electrically operated irrigation pumps, and irrigation contributes directly to increased agricultural productivity.

B. Are All Five Elements of Agriculture Critical? Has successful agricultural development occurred in the absence of investments in one or more of these five areas?

There is little in the literature that directly addresses the counterfactual question concerning whether or not agricultural development can be achieved in the absence of investment in any of the five key elements of agriculture. What does emerge is that a country's predisposition to agricultural development is an important condition to success -- whether or not this predisposition is linked to donor investments. In particular, some level of economic and social stability is essential for agricultural progress. This is not to suggest that the macroeconomic environment must be highly supportive. For example, a number of countries such as China and Brazil show that agriculture can make considerable progress without optimal support. However, an egregiously unfavorable macroeconomic climate found in countries such as North Korea or Cuba does not enable agriculture to succeed.

Discussion

Policy Reform and Planning. The most successful policy reform activities were those that supported an existing program of policy change, as distinct from those that tried to introduce new policies. The literature shows that attempts to introduce major new policy directions through program assistance often produced disappointing results (Wolgin, 1990, p. ii). Similarly, successful projects occurred most frequently in those countries where reforms were already underway and were strongly supported by the countries' leadership. Countries

that were resisting reform had little use for even the most cogent and forceful of analyses.

Investments in capacity building were also most effective when they received active host country support. The most successful capacity building projects were those where advisors had access to senior government officials, appropriate counterparts were assigned to advisors, there was adequate funding and supplies, and there were incentives for highly trained staff to stay with the analysis units (Tilney and Block, 1988b, p. 12; Abt Associates et al, 1989, p. 31).

Agricultural Technology Development and Diffusion. Except for certain isolated instances (such as Botswana and Singapore), most countries have not achieved sustained economic growth without transforming agriculture; and the agricultural transformation has generally rested squarely on intensification and technical change (Staatz, forthcoming). It is true that countries with a large land frontier have been able to increase their agricultural output through acreage expansion. But once the frontier is exhausted, these relatively easy gains in output must be replaced by increasing yields on existing land. This requires improved biological and mechanical technology.

Although agricultural extension can have a positive impact on the adoption of new crop varieties, there is no evidence that extension is a necessary component of successful technology development and diffusion. In the Philippines, for example, there is widespread use of a rice variety developed, but never formally distributed, by IRRI; in spite of this, farmers found a way to adopt this variety without the extension system. Other countries, such as Jordan, rely heavily on domestic private input supply firms to obtain and diffuse timely technology from around the world (Tweeten, 1994).

The highest priority for investing in education in developing countries is at the elementary and, to a lesser extent, at the secondary level. Higher education, including agricultural education, is relatively less important. Although there is often a presumption that an indigenous capacity to train agricultural scientists is a necessary requirement for agricultural development (Johnston et al, 1987, p. 127), there is no evidence that this is a necessary condition for technology development per se, because scientists can be provided externally, at least in the short term. Although universities have frequently been at the forefront of major production gains by developing seed varieties, the overall impact of host-country universities on technology development is mixed (Hansen, 1989).

Rural Infrastructure. The IFPRI synthesis, which compares the extent of infrastructure development in Africa and Asia, suggests that agricultural growth will probably not occur in the absence of investments in rural infrastructure; but to the extent growth does occur in the absence of such investments, it will occur far less rapidly.

Agricultural Services. No country is likely to achieve a high level of agricultural development without investment in agricultural services. The greater the level of agricultural development, the greater the variety and sophistication of the services demanded. The

private sector is often the most efficient vehicle for providing such services.

C. When Are Investments in Agriculture Most Successful? Under what conditions have investments in each of the agriculture areas been relatively successful, or resulted in a relatively high economic rate of return?

Investments in agriculture have been most successful when a bottleneck has been relieved in the presence of favorable preconditions. That is, agricultural research is more likely to have a high payoff in countries characterized by sound economic policies and basic infrastructure. Similarly, infrastructure investments are more likely to have a high payoff in the presence of supportive economic policies and the availability of improved agricultural technology. Economic analyses have not been very helpful in guiding resource allocation among sectors of an economy (or among the key elements of agriculture), although they have helped in making intra-sectoral choices among various types of projects, technical alternatives, and priorities.

Discussion

Policy Reform and Planning. The evaluation literature looks at success in terms of meeting program and project objectives rather than by calculating economic rates of return. Even the World Bank, which as a rule estimates rates of return for its projects, notes that these measures are not applicable to policy reform and planning operations (World Bank, 1993, p. 75).

Donor investments in agricultural policy reform and planning have had mixed results. Some activities have been quite successful, while others only partially achieved their objectives or had negligible impact. One study found that of approximately 80 World Bank adjustment operations, 68 percent of those dealing with agricultural price policies successfully fulfilled conditionalities (Knudsen and Nash, 1991). Another study found that about 60 percent of the policy changes contained in World Bank conditionalities were fully implemented (McCleary, 1991). USAID's activities supported by program assistance also resulted in a mix of full and partial implementation of conditions, covenants, and self-help measures that were attached to the programs. One review showed that between one-half and three-quarters of the activities were successful.

According to a review of 61 USAID projects designed to support capacity building and policy analysis, 58 percent were successful to some degree in attaining institution building objectives. Only 39 percent had an impact on decision-makers, such as increasing their demand for analysis or improving their understanding of the agricultural sector and its relationships with other sectors of the economy. Even fewer projects (33 percent) were successful in achieving concrete changes in policy as a result of analytical and planning activities. Fifty-eight of the 61 projects had significant success in creating policy or planning

units and in staff development (Tilney and Block, 1988b).

Agricultural Technology Development and Diffusion. One lesson from the rate of return literature overwhelms all others: investments in agricultural technology development and diffusion have typically generated high rates of return, demonstrating that the social benefits from the investments justify the costs in a wide variety of countries, for a wide variety of commodities, and under diverse conditions. However, agricultural research can contribute to increased productivity only if farmers adopt the new technologies, and this requires an economic policy environment that provides an opportunity for farmers to make a profit. It also requires the availability of complementary inputs and a marketing system that functions.

Rural Infrastructure. Resources tend to be allocated to infrastructure development only when bottlenecks and pressure for services are felt within the political system. And when this occurs, decisions on how much to allocate to infrastructure vis-a-vis other activities are typically a matter of judgement "bordering on the act of shooting in the dark" (Ahmed and Donovan, 1992). The cost of infrastructure development varies tremendously across geographic regions. However, estimates of the cost of road construction and maintenance per kilometer are less for Africa than for Asia and Latin America, partly because of the less difficult terrain in Africa. This is true for both labor-intensive construction and capital-intensive construction in the three regions. On the other hand, if the cost of road construction were calculated per unit of agricultural production (rather than per kilometer), it may be higher in Africa than in the other regions, since agricultural production is relatively low in Africa.

Agricultural Services. Very few studies measure the economic rate of return to investments in agricultural services. This is partly because of the difficulty of measuring the return to these investments which, by their nature, do not directly increase agricultural output. Instead, the chief contribution of agricultural services is to facilitate the use of directly productive inputs, such as improved seeds, fertilizers, chemicals, and machinery. According to Jaffe, the conditions necessary to achieve a high rate of return to investments in agricultural services include favorable natural resources; appropriate macroeconomic policies; strong human capital; well-developed physical infrastructure; capacity to develop or adopt technology; prior or parallel development of complementary industries; and a dominant role of the private sector in the provision of services (Jaffe, 1993). In the absence of these conditions, especially the availability of new inputs and technologies with a high payoff, investments in agricultural services are unlikely to be effective.

Asset Distribution and Access. There are at least two costs of not investing in a more equitable distribution of land and other agricultural assets. First, there are economic costs associated with maintaining an agrarian structure characterized by high efficiency losses, low profitability, and few incentives to invest in physical and human capital in the agriculture sector. Second, there are social costs manifested by peasant uprisings, civil war, and protracted and violent struggles. The single most important reason governments do not invest in more equitable land distribution is that they lack the political support to implement

change. Their constituencies are often deeply divided on issues of land reform and asset redistribution. Also, the cost of land reform is so high as to make it infeasible in many cases. Small farmers cannot pay for the land they receive, and elites tend to resist paying for the reform either through taxes or through receipt of devalued bonds as compensation for expropriated land.

D. The Role of the Public and Private Sectors. Is the private sector best suited to invest in certain areas (such as agriculture services), and is the public sector best suited to invest in other areas (such as rural infrastructure)?

A useful rule of thumb is that the government should become involved in a particular investment only if it raises real national income. Another useful rule is for the public sector to become involved when it improves the private sector rather than displaces it. It is logical that the public sector invest in areas such as the development of technology and of rural infrastructure, especially when they have the characteristics of public goods. If they are really public goods, the private sector will not provide them unless paid by the public sector to do so -- which may be more efficient in some cases. On the other hand, some kinds of research (for example, the development of hybrid seeds and mechanical inputs) can and should be carried out by the private sector because there is an incentive for the private sector to be involved. The public sector has been the recipient of most donor assistance designed to support policy reform and planning as well as to improve asset distribution and access -- largely because it is governments' responsibility to take decisions in these areas. In contrast, the private sector can be expected to invest in agricultural services when it is profitable to do so.

Discussion

Policy Reform and Planning. Program assistance provided by virtually all donors in policy reform and planning has been directed to central governments alone. Project aid has also gone primarily to support ministries of agriculture, with some support to ministries of finance or planning. In a sense, this is proper since policy and planning activities are conducted by the public sector. However, policy analysis need not be conducted in a narrowly defined policy analysis unit of a ministry, but instead can be performed by teams of analysts drawn from public and private institutions, including universities, private firms, and individuals. The evaluation literature consistently shows that policy analysis and capacity building are most effective when they are demand-driven; that is, when they respond to current needs identified in a ministry or in the economy. Too often, activities are supply-driven, and host-country government staff and project advisor services are utilized as free goods.

Agricultural Technology Development and Diffusion. Governments need to invest in public goods, such as agricultural research, since it is difficult for a private firm to provide these services and still recover its costs by charging users for the benefits they receive. Indeed,

the primary rationale for the public sector's involvement in many areas of agricultural research is that incentives for private sector research have not been adequate to induce an optimum level of investment; that is, the social rate of return exceeds the private rate of return because a large share of the gains from research are captured by other firms and consumers rather than by the innovating firm (Ruttan, 1982, p. 182).

However, endowed foundations, which lie somewhere on the continuum between public and private research organizations, may be an alternative. As of 1988, there were seven agricultural research foundations in Latin America that were either funded or proposed by USAID (Sarles, 1988, p. 218), and three similar endowments for agricultural research have been proposed for Africa (Weatherly and Warnken, 1994, p. 3).

Rural Infrastructure. Most rural infrastructure, like most agricultural research, is a public good that is provided by the public sector in practically all countries (or by private entities subject to public control). Because of externalities (the "free rider" problem), the private sector is unlikely to invest in rural infrastructure. However, the private sector can do the job of actually building roads or irrigation canals and maintaining them with proper support from the public sector. Note, however, that the cost of using the services made possible by the rural infrastructure (the water and the electricity) -- as distinct from the infrastructure itself -- should be paid by the users of those services, not by the government (through tax revenues) or by donors.

Agricultural Services. Generally, the private sector is best equipped to provide agricultural inputs and services as long as they can be sold for a profit. Farmers will pay the cost of these inputs (such as hybrid seeds and fertilizer) and services (such as credit and marketing) if they find it profitable to do so. The weak performance of government banks and parastatal marketing boards suggests that governments often do a poor job of delivering agricultural services.

Asset Distribution and Access. The evaluation literature does not compare the relative merits of public sector and private sector institutions in dealing with land issues; nor does it compare market mechanisms with non-market mechanisms in achieving a more equitable distribution of land. However, interventions designed to influence the distribution of agricultural assets, and to change the agrarian structure, are invariably taken by public sector institutions. The lack of political will on the part of most governments, in turn due to the lack of constituent support, has been the principal factor limiting land reforms and related interventions.

E. The Role of Alternative Implementing Agencies. Among the various agencies that implement agriculture activities (including NGOs), are some better suited in certain areas than others?

For the most part, the evaluation literature is silent on this question. The discussion below is, therefore, largely impressionistic.

Discussion

Policy Reform and Planning. Program assistance to support policy reform has been implemented strictly by donors in the past. USAID involvement has been important in providing both the analytical underpinning for policy reform programs and in monitoring their implementation (Liebersohn, 1991, pp. viii-ix). The World Bank also found a clear correlation between good performance of adjustment programs and adequate identification, preparation, and supervision of such programs (World Bank, 1993a, p. xvii).

Some USAID capacity building projects have been implemented by universities and NGOs, private firms, and PASA arrangements with other U.S. Government agencies. These implementing agencies have both strengths and weaknesses. University contractors have been particularly well suited for implementing overseas training for host country nationals because they could offer a pool of in-house technical staff that was involved with the project on a continuing basis. Yet university contractors have had the disadvantage of weak management structures, which may cause some concern because the literature on project implementation indicates that good management is the single most important factor associated with successful projects. In contrast, private firms were strongest in their ability to manage projects efficiently, though they may be less appropriate than universities for implementing long-term training programs. Management capabilities were also a weak point for the PASA arrangements in the projects reviewed (Tilney and Block, 1988c, p. 17). Finally, private firms tend to focus strictly on project objectives, while NGOs and universities sometimes focus on their own agendas as well as on project objectives.

Agricultural Technology Development and Diffusion. Some have asserted that U.S. land grant universities are well positioned to implement agricultural technology development and diffusion activities, but the evaluation literature provides no empirical evidence to substantiate or refute this assertion.

Rural Infrastructure. Conventional wisdom suggests that private contractors are best suited to implement infrastructure activities, but there is no empirical evidence to support this one way or the other. It may be appropriate for user organizations (managed perhaps by NGOs) to maintain rural infrastructure, especially rural roads and irrigation canals, but again, evidence from the evaluation literature is lacking.

Agricultural Services. Commercial banks have the best record of providing financial services; in some cases, cooperatives and credit unions have also been successful. In contrast, most NGO credit programs have been highly subsidized in the past and their long-term viability without continuous subsidies has been questionable. Private firms also have a better track record than government agencies of providing efficient and timely agricultural inputs and marketing services; some cooperatives have been successful in this area as well,

but many have failed.

Asset Distribution and Access. Governments are best suited to implement programs designed to improve asset distribution. As is the case with the other four elements of agriculture, donor agencies may be well suited to advise governments on how best to go about implementing these programs. For example, they can provide technical assistance on setting up cadasters, titling and registration programs, and land taxation systems.

F. The Comparative Advantage of the U. S. Does the U.S. have a comparative advantage in providing agricultural assistance in some areas compared to others?

The sixth question concerns the comparative advantage the U.S. might have in providing assistance in each of the five elements of agricultural development. Note that the U.S. may have an absolute advantage -- that is, may be best -- in providing assistance in all five areas. But the question concerns the U.S. comparative advantage.

Discussion

Policy Reform and Planning. The evaluation literature suggests that the U.S. has an advantage over other bilateral donors in providing assistance in the area of agricultural policy reform and planning. The advantage holds for both program and project activities. On the program side, resident missions give USAID the ability to conduct and monitor operations in a more direct style than other donors (Wolgin, 1990, p. 24; Vondal, 1989, pp. 3-6; Weintraub, 1989, pp. 26-31). The U.S. comparative advantage is also strong in training activities which draw on the resources of the American higher education system; in agriculture, this system is unmatched elsewhere in the world.

Agricultural Technology Development and Diffusion. U.S. agriculture is among the most productive in the world, which is due in large part to yield-increasing technology developed as a result of investments in agricultural research. Because of this, some have asserted that the U.S. enjoys a comparative advantage in providing assistance in this area, but there is no empirical evidence to substantiate the assertion.

Rural Infrastructure. The development of rural infrastructure often requires a major capital investment. In view of this, donors with a large supply of resources, including the multilateral development banks, would seem to be in the best position to finance big-ticket capital projects.

Agricultural Services. The U.S. has a large pool of analytical talent to study problems concerning the delivery of financial and other agricultural services, but the private sector in the recipient country is ordinarily best equipped to deliver such services.

Asset Distribution and Access. International donors have very little influence over whether or not programs designed to alter the agrarian structure take place. Such programs are initiated because of their political nature and require an internal political commitment (Montgomery, 1984). One lesson of the Alliance for Progress was that financial assistance and political pressure from the outside are not sufficient to convince an unsupportive government to implement a meaningful reform (Dorner, 1992). Moreover, by law the U.S. cannot support land acquisition and transfer costs, unless such support is identified as being in the national interest. On the other hand, the most obvious failures of land reform are those that have left the new owners without ancillary services after the old support system was withdrawn (Montgomery, 1984). The U.S. appears to have a comparative advantage in providing assistance in some of the other four elements of agricultural development which would serve to remedy this failure.

4. MANAGEMENT IMPLICATIONS

What are the implications for USAID management? The evaluation literature provides clear answers to some -- but not all -- of the six questions that were raised at the outset. But even when the evaluation literature is unclear, it provides certain insights that can help USAID understand better some of the key issues concerning agricultural development in the low income countries.

1. There is no substitute for careful analysis of each country situation. Although the findings reported in Part 3 seem reasonable, consistent with conventional wisdom, and, in many cases, applicable across most countries, one needs to recognize them for what they are: generalizations derived from as thorough an examination of the evaluation literature as was possible within a relatively short timeframe. The management implications suggested below should be understood in that context.
2. A country's predisposition to agricultural development is an important condition to success -- whether or not this predisposition is linked to donor investments. In countries where agriculture cannot be profitable because of an adverse economic policy environment, defined to include both the macroeconomic policy environment and the agricultural policy environment, USAID should be reluctant to invest in agricultural development.

* * *

When USAID has decided that it makes sense to invest in agricultural development, the following generalizations merit consideration.

3. Because there is a preferred sequencing of investments in agriculture, USAID should focus its investments on those priority areas that typically constitute the key bottlenecks to agricultural growth. In the low income developing countries, these key bottlenecks are most likely to occur in the areas of policy reform, technology development, and rural infrastructure. They are least likely to occur in the areas of agricultural services and asset distribution. USAID's objective of investing in the agriculture sector should be to alleviate the binding constraints (not all the constraints) to agricultural growth.
4. Program assistance can help governments of low income developing countries create an economic policy environment designed to help agriculture markets work. Such investments are most successful when they are used to facilitate on-going economic policy reforms. They are generally not as successful when they are used to initiate new policy reforms or to "buy" economic policy reforms to which the government is not committed. USAID should provide program assistance to support policy reform

only in countries where it will be used to facilitate on-going policy reforms. USAID should also support the training of those most likely to return to their countries and become leaders in giving policy advice.

5. If high economic rates of return were the only criterion USAID used in deciding how to invest in the agriculture sector, investing in the development of new technology would probably top the list. An even more compelling reason to invest in the development of new high-yielding or cost-reducing agricultural technologies is that most countries have not achieved sustained economic growth without transforming their agriculture; and the agricultural transformation typically requires technical change -- that is, improved biological and mechanical technology. USAID should emphasize adaptive research rather than basic research, including technology transfer from neighboring countries and the CGIAR system. USAID should also support agricultural research which is necessary to sustain existing yield levels.
6. It is unlikely that agricultural growth will occur in the absence of investments in rural infrastructure. However, donors, including USAID, are understandably reluctant to invest in rural infrastructure, not only because such investments are relatively costly but also because existing infrastructure is often not maintained by the public sector. This is partly because many governments of low income countries have insufficient resources to support the maintenance of rural infrastructure (especially in the face of structural adjustment programs that typically require governments to reduce public sector expenditures). Donors, including perhaps USAID, should invest in new rural infrastructure and -- if justified by economic analysis -- in the maintenance of existing rural infrastructure as well.
7. The private sector is best equipped to provide agricultural inputs and services that can be sold for a profit. The public sector has an important role to play in helping markets work better (as distinct from displacing markets). Donors, including USAID, may be in a position to advise developing countries on how best to establish input distribution systems, strengthen financial services, support marketing and storage activities, and develop price information systems. Actual investments in the agricultural services area are best left to the private sector.
8. Programs designed to improve the distribution of land and other agricultural assets are motivated by political objectives, not by agricultural development objectives. Donors, including USAID, may be in a position to advise governments of developing countries on how best to implement titling schemes, cadastral surveys, land reforms, and other activities designed to improve access to agricultural assets. Beyond that, investments in this area are best left to the public sector.

ANNEX A

The Role of Agriculture in Economic Growth¹

Economic development is a process by which an economy is transformed from one that is dominantly rural and agricultural to one that is dominantly urban, industrial, and service-oriented. As a result, economists studying economic growth have, with few exceptions, tended to neglect agriculture and concentrate instead on strategies for industrialization. The intellectual neglect of agriculture's role in development is rooted partly in an underlying view that agriculture is backward and partly in a desire to move directly to building those sectors of an economy that carry an image of modernization. In addition, political systems, which are typically urban-based, have tended to direct resources to the urban, industrial sector. To this day, the role of agriculture in economic development is hotly debated.

A careful look at the economic history of many of the now developed countries suggests that it is difficult to separate an agricultural revolution from an industrial revolution. A revolution in the agricultural sector will trigger increases in farm productivity, in the demand for agro-industrial products, and in the purchasing power of rural households, thereby expanding the market for consumer goods and thus creating pressure for industrialization. An industrialization program pursued without regard for agriculture, on the other hand, is unlikely to succeed. Either the supply of foreign exchange or the size of the domestic market will be insufficient to sustain the program.

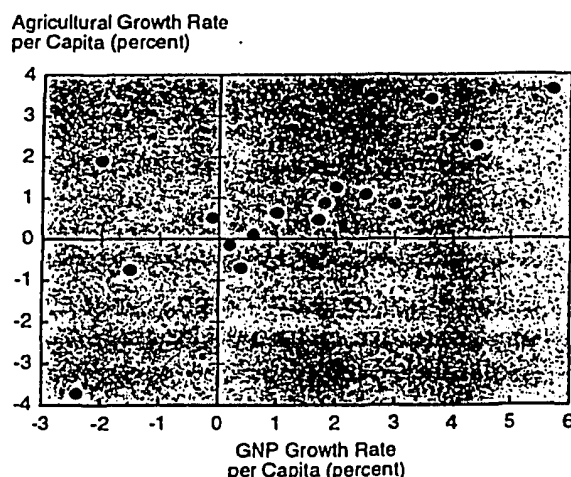
IFPRI analyses have shown that most of the developing countries that grew rapidly during the 1980s experienced rapid agricultural growth in the preceding years (von Braun et al, 1993). For example, China's remarkable annual growth rate of 9.5 percent in the 1980s was stimulated by agricultural policy reform and support of the farm sector in the late 1970s and early 1980s. Indonesia's annual agricultural growth of 4.3 percent during 1965-1980 facilitated annual GDP growth of 5.5 percent during 1980-1990. Thailand's agricultural growth of 4.6 percent per year during 1965-1980 contributed to annual GDP growth of 7.6 percent in 1980-1990.

There is a 75 percent correlation between agricultural growth and overall economic growth in the least developed countries, and a 21 percent correlation between these growth rates in the less developed and middle-income countries over the 1965-1989 period (von Braun, 1991). The high correlation in the least developed countries is not surprising, given the large share

¹Many analysts have examined the role of agriculture in economic growth. See, for example, John W. Mellor, "Agriculture on the Road to Industrialization," 1986; Jose Rene C. Gayo, "Agriculture's Place in Economic Development (and the Pitfalls of a Myopic Industrialization Strategy)," 1993; and G. Edward Schuh, "Macroeconomics of World Agriculture," n.d.

of the agriculture sector in these economies: agriculture contributes about one-third of the gross domestic product (GDP) in low income countries and employs more than one-half of the labor force. As suggested by Figure A-1, neglecting agriculture adversely affects the rest of the economy. In short, it is difficult, if not impossible, to stimulate sustained economic growth in the least developed countries without first moving the largest sector, agriculture.

**Figure A-1. Agricultural Growth and Economic Growth
in 16 Low-income Developing Countries, 1965-1989**



Source: World Bank, World Development Report 1991 (New York: Oxford University Press, 1991).

Note: Countries include Bangladesh, Burundi, China, Ghana, India, Indonesia, Kenya, Malawi, Mali, Nepal, Niger, Nigeria, Pakistan, Sri Lanka, Tanzania, and Zambia.

Schuh provides a clear exposition of how investments in agriculture, especially to develop new agricultural technology, can serve as a powerful source of overall economic growth (Schuh, n.d.). The introduction of new technology (the product of agricultural research) has the effect of increasing yields and/or reducing the cost of production. Early adopters of this technology will tend to reap its initial benefits, for they will have lower costs of production while the product price is not yet affected. However, as the adoption of the technology spreads, the increase in supply that results tends to drive the product price down. Most of the benefits of the new technology are thus passed to the consumer, especially if the

commodity for which the new technology is produced is one that is domestically consumed (such as rice). These benefits to the consumer can be large, and this is one of the reasons why the estimated rates of return to investments in agricultural research are so high.

Moreover, since poor people tend to spend a larger share of their budget on food than do middle and upper income people, the poor tend to benefit in a relative sense. In addition, the decline in the price of a major consumable good (food) results in increased personal income, which is a powerful source of additional economic growth. The effect is to increase the demand for other consumer goods and services and thus stimulate employment and more general economic growth.

Another effect of agricultural growth occurs from the fact that food is a wage good. Changes in the real price of food can obviously have a significant effect on the real wage workers receive. As the price of food drops, the real wage may rise even though the nominal wage is still unchanged. To put it somewhat differently, the welfare of workers may rise even though the nominal wage has not risen. This helps firms in the economy as a whole become more profitable, since workers benefit from higher real wages even though the firms do not have to pay higher nominal wages.

If the new production technology happens to be for a tradeable good (such as coffee), foreign exchange earnings will tend to increase, either because the country becomes more competitive in international markets and thus will increase its exports, or because imports of the commodity will decline and foreign exchange will be saved that way. In either case, more foreign exchange becomes available to finance a higher rate of growth in the domestic economy. In the case of tradeable goods (like coffee), farmers (producers) will receive a larger share of the benefits, while in the case of nontradeable goods (like food), the benefits will be distributed more broadly in society and will favor the poor.

It is understandable, then, why investments in agricultural research designed to produce new production technology are now widely accepted as the most efficacious means of promoting agricultural development. Of course, the success of this approach is predicated on farmers' adopting the new production technology, and this, in turn, is predicated on an economic policy framework that creates an opportunity for farmers to make a profit. The developing countries tend to discriminate against their agriculture by overvaluing their currencies (an implicit export tax and import subsidy) and by imposing domestic price controls to keep the price of food low (thereby favoring urban consumers). The result is that the domestic prices of agricultural commodities in these countries tend to be substantially below international market-clearing levels, and the incentive for farmers to adopt new technologies is weakened. The developed countries (the European Community, Japan, and the U.S.), on the other hand, provide high levels of protection for their agricultural sector, with domestic prices substantially above international market-clearing levels; moreover, these countries tend to dump on the international market the excess supplies that accumulate in government hands as a result of the domestic commodity programs. Because of these distorted incentive structures, far too much of the world's agricultural output is produced in the high cost

developed countries; far too little is produced in the low cost developing countries¹.

Therefore, to the extent a country's economic policy environment encourages the adoption of new, high productivity technology, a modern agriculture sector can emerge to support overall economic growth. This recognizes that:

- Agriculture is the major source of exports, and therefore is the major source of foreign exchange needed to pay for imported capital equipment and raw materials required by other sectors.
- Agriculture contributes to poverty reduction because it leads to an increase in the supply of less expensive food as well as to an increase in the demand for labor.
- Agriculture is a source of employment for the rapidly growing rural population, and eventually it supplies labor to the industrial sector.
- Agriculture generates savings for use by industry or by the government to invest in social overhead capital.
- Agriculture supplies raw materials to industry and generates demand for industrial products.

The more efficient agriculture is, the better it can perform these functions.

¹The 1986 World Development Report provides a thorough analysis of these distortions in the agricultural sector and how they adversely affect economic development. (World Bank, World Development Report 1986, Washington, D.C.: The World Bank, 1986.)

ANNEX B

Evaluation Synthesis Methodology

This annex examines the GAO evaluation synthesis methodology and the extent to which it is useful in carrying out, relatively quickly, desk studies that evaluate the effectiveness of USAID development assistance programs.

*A. What is the GAO Evaluation Synthesis Methodology?*¹

Over the past several decades the U.S. General Accounting Office (GAO) has developed a series of methodological approaches for furnishing analytical information to congressional decision makers on issues and options under legislative consideration. One of these approaches is the evaluation synthesis methodology, which has evolved as a means of providing Congress with objective evidence on the performance of nationwide federal government social service programs. The GAO describes the methodology as follows:

The Evaluation Synthesis presents techniques by which questions about a federal program are developed collaboratively with congressional committee staff, existing studies addressing those questions are identified and collected, and the studies are assessed in terms of their quality and, based on the strength of the evidence supporting the findings, used as a data base for answering the questions. The end-product is information about the state of knowledge in relation to the particular questions at a particular point in time (GAO, 1992, p. 1).

The methodology has been codified into seven steps.

1. Specify the Questions to be Answered. This is a critical step. In this study, the CDIE concept paper specified six questions that were of interest to the intended audience, senior USAID officials. It was anticipated that the methodology might not be totally appropriate for answering all six of these questions.

2. Gather the Universe of Documentation. Given the breadth of topics to be covered under this study, it was clearly impossible to start with the "universe of documentation." The CDIE concept paper provided a preliminary list of relevant documentation, illustrating the type of documents to be reviewed. These included syntheses of evaluations of programs

¹Much of the information in this section is based on GAO, The Evaluation Synthesis, Washington, D.C.: GAO, March 1992.

and projects in the five agriculture sub-sectors; monographs and journal articles of a more general nature; and summaries of research results. Many of these documents cited evidence (often empirical evidence) in other documents, and these citations represented a fourth source of documentation. A computerized search of potentially relevant documents included in the USAID data base constituted yet another source. The consultants, who were specialists in one or more of the five sub-sectors, were responsible for assembling as much relevant documentation as possible given the time and resource constraints.

3. Develop Criteria for Choosing Studies. A vast literature exists within each of the five sub-sectors of agricultural development. This necessitated a high degree of selectivity in choosing studies to review. The IFPRI synthesis on rural infrastructure (Ahmed and Donovan, 1992) served as a model of the type of information to be gathered for each of the other four sub-sectors. Studies were to be selected and reviewed if they provide credible, reliable, and accurate evidence (generally of an empirical nature) that would help to answer one or more of the six questions. The expert consultants were expected to make these judgements.

4. Organize and Implement a Reviewing Strategy. The IFPRI synthesis served as a model for organizing a reviewing strategy. The consultants were to work in close collaboration with each other (and with CDIE), and the work was to be done in an iterative fashion. This was facilitated by three, day-long study meetings (at the beginning, middle, and end of the time allocated for the sub-sector studies). This provided an opportunity not only to determine the extent to which the synthesis methodology was appropriate for answering all six questions (Step 5.), but also to begin synthesizing the five background papers. Given the diversity of the materials reviewed and different work methods used by the consultants, review strategies varied in their detail. However, the group meetings emphasized adherence to basic principles such as "letting the literature speak for itself;" that is, limiting the extent to which the consultants injected their own opinions into the syntheses that they reviewed.

5. Redetermine Appropriateness of the Synthesis Method. It was recognized by the consultants (as well as by CDIE) that the evaluation synthesis methodology could deliver only so much, and that it might not be possible to answer all six questions using this methodology. It was anticipated by CDIE that, if need be, alternative methodologies, or an alternative way of casting the questions, might be needed.

6. Implement the Evaluation Synthesis and Check for Problems. As suggested above, the consultants and CDIE met at predetermined intervals to identify problems and make appropriate adjustments in the method.

7. Present Findings. The IFPRI synthesis on rural infrastructure also served as the model for presenting information on the other four sub-sectors. The main idea in the GAO method is to present findings in the simplest way possible consistent with an accurate transmission of the main points and complexity of the subject matter. This can involve the use of strict page limits and graphical means of presentation.

B. *Using the GAO Evaluation Synthesis Methodology for this Desk Study*

This desk study illustrates some of the difficulties one can encounter when using the GAO evaluation synthesis methodology. These can best be illustrated by discussing each of the seven steps of the method.

1. Specify the Questions to be Answered. First, some of the questions -- as posed -- were not amenable to being answered using information generally available in most of the evaluations. ("The literature reviewed does not cover this topic" was a frequently cited comment in the individual background papers.) Therefore, for some of the six questions, the consultants had to rely exclusively on their own experience. Second, the consultants had no input into the specification of the questions to be answered and no interaction with the intended audience (USAID senior decision makers). Third, although the six questions are relevant and important, some of them could perhaps be more easily and meaningfully answered by a relatively large panel of experts (representing countries at different stages of agricultural growth) and by panels of sub-sector experts.

2. Gather the Universe of Documentation. Given the subject matter, gathering relevant documentation (even for experienced consultants who are experts in their fields) was a major task given the time frame. In fact, the literature review stage was so time consuming that it may have excessively reduced the time available to synthesize and analyze findings and draw conclusions.

3. Develop Criteria for Choosing Studies; and 4. Organize and Implement a Reviewing Strategy. Given the breadth of the subject matter covered and the large variations in the nature and availability of evaluation material to review and synthesize, the criteria for choosing studies varied among the sub-sectors. For example, more literature was available, and more of it had been systematically "digested," for some sub-sectors than for others. Thus, some consultants had to rely more on individual case studies and less on well done syntheses of evaluations.

5. Redetermine Appropriateness of the Synthesis Method. For all intents and purposes, this step was overlooked and the synthesis method was judged, implicitly, to be appropriate. For example, even though some of the consultants had problems addressing some of the questions as originally stated, none of the questions was dropped or significantly modified at this stage. Of course, learning that the evaluation literature was not helpful in answering certain questions was an important finding in and of itself.

6. Implement Evaluation Synthesis and Check for Problems; and 7. Present Findings. In spite of the limitations noted above, the consultants did not encounter any problems in these last two steps. The general quality of the background papers was quite high. However, some of the consultants required more time to revise and edit their papers than had been budgeted.

C. Using the GAO Evaluation Synthesis Methodology for USAID Assessments

The GAO has used the methodology to evaluate social service programs such as the CETA job training centers; the WIC food programs for women, infants and children; the OEO "block grants;" and special education programs for handicapped children. Much of the methodological discussion in the GAO manual concerns large numbers of "replications" and "treatment groups." In short, the GAO methodology seems to have been used to evaluate programs that are quite different in scope, homogeneity, number of replications, and other key features from the types of activities that characterize USAID's socio-economic development work. Therefore, it may not work as well for agricultural development programs implemented overseas as it does for federal social service programs implemented in the U.S.

In particular, the types of programs evaluated by GAO tend to have: (a) many (often hundreds) of replications of the same narrowly focused program activity; (b) replications that occur during the same time period (e.g., FY 1986-89); and (c) a standardized evaluation format (often with evaluation reports already collected in a departmental file cabinet in Washington waiting to be synthesized).

The basic thrust of the GAO methodology concerns the relationship between perceived program success and how programs were implemented. For example, the GAO manual discusses the use of different "treatments" in the manner commonly used by experimental psychologists and sociologists. Although the desk study sought to identify the conditions under which activities in the five agriculture sub-sectors were more likely to succeed, it did not focus as much on implementation issues.

D. Conclusions and Recommendations

Because the GAO methodology relies exclusively on the synthesis of existing materials, it does not require the costly collection of additional evaluation material. Cost is always an important consideration, but especially during a period of severe budgetary constraints. The use of the GAO evaluation synthesis methodology for a very broadly defined topic, such as investments in agriculture, may or may not be appropriate. However, the general principles that underlie the methodology make sense, and its use may be appropriate for evaluating other USAID programs.

1. At the most general level, the following principles underlying the methodology should be applied to all USAID evaluation studies and perhaps incorporated into a CDIE "evaluation manual."

- At the outset there should be a clear definition of the questions to be answered and

the boundaries of written sources to be used. When possible, the evaluation team should develop the key issues to be addressed in collaboration with members of the "target audience" or "client group," in this case, USAID senior staff.

- The most important principle in producing a synthesis of evaluation results is to let the evaluations speak for themselves and to be rigorous in filtering out the author's personal views unless they correspond with stated findings or conclusions in the evaluations. Specific techniques should be used to reduce "evaluator bias" and to let the sources "speak for themselves."
- As necessary, the initial set of questions, the sources of evaluation information, and the evaluation synthesis procedures should be reviewed and modified as needed. A clear and coherent list of the projects to be evaluated and the evaluation reports to be consulted should be specified. If new ideas are found during the "first round" of the synthesis process, the evaluation team should meet again with the representatives of the target audience to review the initial questions, and modify or replace them if necessary. It may be useful to review each of the seven "basic steps" of the methodology several times, because it is not always clear at the outset what the relevant literature is that should be synthesized.

2. The GAO methodology can be used most successfully with USAID programs that have the following characteristics:

- The programs are in the area of services, such as population, housing, education, disaster relief, and health and nutrition. Even in the area of agricultural development, the GAO methodology might be appropriate for evaluating, for example, a specific type of agricultural credit project (e.g., loans to national agricultural credit banks to be on-lent to farmers), assuming enough of these projects had been implemented and evaluated to permit a representative synthesis. Even then, however, there may be considerable variance in measuring dependent variables (such as repayment rates) because the projects were implemented in many national environments (a problem which is minimized in evaluating federal social services programs implemented only within the U.S.).
- There have been sufficient replications of a particular project type, implemented over a specific, limited time frame (five to ten years), to permit a comparative evaluation.
- A reasonably standardized methodology was already used to evaluate the projects, so that it is clear *a priori* what documents should be synthesized. This would not, however, preclude the use of illustrative case studies and academic literature to complement the core documentation.

3. As part of the proposed CDIE "evaluation manual," there should be an elaboration of the "evaluation synthesis methodology" that recognizes the need to:

- Specify appropriate economic, as well as sociological, performance criteria; the latter dominate the GAO methodology.
 - Combine in the evaluation synthesis: (a) qualitative as well as quantitative information; (b) case studies as well as more systematic evaluations; (c) rates of return as well as other measures of success; and (d) political as well as socio-economic variables.¹
 - Make modifications to accommodate the realities of socio-economic development; for example, long time periods, small sample sizes, and the difficulty of comparison across countries with widely divergent social, cultural, and religious values.
4. Objective project evaluations in the field should be consistently undertaken. This will facilitate programmatic syntheses done later in the home office, which makes sense from both a financial and management point of view.

¹The second half of the GAO manual is largely devoted to these methodological issues, but primarily from the point of view of sociology, experimental psychology, or the even murkier "evaluation science."

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¹The bibliography includes only those documents cited in the present desk study; it is far from exhaustive. Each of the five background studies on which the synthesis was based includes a more complete bibliography. In addition, CDIE's Research and Reference Service conducted a literature search when the study was initiated, and that effort yielded an even richer data base.

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